

Psychological Bulletin

PSYCHOLOGICAL CHANGES IN ORGANIC BRAIN LESIONS AND ABLATIONS*

SEYMOUR G. KLEBANOFF

I. INTRODUCTION

The general symptoms occurring in conditions of organic brain disease and those which may be considered to be of diagnostic and localizing value appear to fall into two basic categories. On the one hand, there are the various clinical neurological signs which manifest themselves in the forms of certain paralyses, anaesthesias, irregular or abnormal reflex activity, choked discs, visual field defects, positive serological findings, and numerous other observable signs. These signs have long served as the fundamental criteria in the diagnosis and localization of brain disease within the limits of the present status of knowledge of cortical localization of motor and sensory function.

On the other hand, increasingly greater attention has been given to certain mental or psychological alterations which occur in cases of organic brain disease. One need only reflect upon the variety and the severity of the mental changes seen in luetic invasion of the central nervous system to be aware of the existence of some relationship between structural damage and impaired psychological functioning. The disturbances of mental functioning observed in patients with cerebral arteriosclerosis offer further evidence for the presumable existence of a relationship between brain structure and mental function. The potential value of the psychological changes occurring in organic brain disease in supplementing clinical neurological findings for purposes of diagnosis and perhaps localization would seem considerable. Such mental manifestations appear to warrant concerted exploration and investigation by means of objective and systematic psychological approaches. Mere symptomatic description of a qualitative nature does not seem to suffice as a methodology to permit subsequent generalization. The development in this field in recent years indicates that the test techniques of clinical psychology may be of considerable value in bringing greater accuracy as well as the necessary organization in such investigations.

The main objective of the present review is to present systematically the studies of the mental disturbances associated with brain disorders in which psychological test techniques have been utilized which have appeared in the literature up to the present time (1941). Such a systematic review seems indicated at this time in the light of the discordant findings and procedures in this area. Studies will be examined with the hope of discovering certain common weaknesses which might account for the lack of system and the inability to evolve any generally accepted conclusions. Further, a review may serve to

* From the Research Service of the Worcester State Hospital, Worcester, Mass. The writer is indebted to Dr. David Shakow for valuable suggestions and criticism.

orient more adequately future studies of the psychological changes in brain disease with regard to procedures and methodology.

Qualitative or clinico-descriptive reports of mental alterations accompanying organic cortical involvement comprise the greater portion of the work in the field. These consist essentially of descriptions of the mental deficits occurring with tumors, traumatic lesions, or ablation of cortical tissue in specific areas of the brain. Although chronologically, this is the primary method of study of the psychological symptomatology, the present review will be concerned mainly with those studies employing psychological test devices or techniques in the measurement of the mental manifestations. However, the fundamental value of the qualitative or descriptive reports should not be minimized. Such observations must inevitably be basic to subsequent attempts to apply more accurate, objective, and specialized psychological techniques to the measurement of the mental manifestations.

II. QUALITATIVE STUDIES OF THE PSYCHOLOGICAL CHANGES IN ORGANIC BRAIN DISORDERS

From the qualitative studies dealing with the mental symptomatology of organic brain disease it is actually possible to list the frequency of the reported occurrence of certain mental symptoms and thus make a profitable first step toward applying more accurate and standardized methods of measurement to the psychological changes which occur. The psychologist faces the task of applying and developing objective and perhaps standardized test techniques for the systematic and accurate measurement of the presence and degree of the qualitatively noted mental symptoms. When and if this is done, the burden placed upon clinical impression with its subjective errors will be lessened. While the basic purpose of this paper is to review the beginnings made in this direction, a better perspective can be obtained by first considering the more salient conclusions to be drawn from the qualitative studies.

The mental changes observed in patients with brain disease must be evaluated from two points of view:

1. The cortical location of the lesion in order to note whether any specific cortical areas are of localizing value with reference to mental changes.
2. The nature of the brain damage, and particularly, the possible differences to be found in the presence of diseased tissue such as tumors or other disturbances, or in the absence of brain tissue such as occurs in cases of surgical ablation.

Only a cursory glance at the literature is necessary to demonstrate the importance of the anterior regions of the cortex with reference to mental symptoms. More precisely, the frontal and temporal regions seem primarily and most frequently involved. The parietal regions play a less dominant role and disease of the occipital area does not appear to give rise to significant mental manifestations.

A. The Frontal Cortex

Traditionally, damage to the frontal lobes has been believed to produce the most marked disturbances of behavior in the psychological sphere. The evolution of this view apparently dates back to the year 1848 when Phineas Gage, a laborer in a small town in Vermont had an iron crowbar driven through the frontal region of the brain in an accident. Although both frontal lobes were destroyed, he survived for twelve years following the accident. Anecdotal data inform us of striking psychological changes in him. Previous to the accident,

he had been an efficient workman, but following the injury he showed a general personality deterioration with emotional decay, loss of finer feelings, immorality, childishness, and irresponsibility so that he was no longer able to hold his former position of teamster. However, it is stated that no observable impairment in the intellectual sphere resulted. Obviously, the absence of any test devices along with the possible low initial level of the patient render this latter observation open to question.

The facts of comparative neuro-anatomy indicate that the frontal cortex attains maximum structural development in man and phylogenetically is the most recent cortical acquisition. It has long been termed man's most vital possession and the highest intellectual and moral functions have been assigned to it. Following is an organized summary of the disturbances of functions which have been observed qualitatively in specific lesions in this region of the human cortex.

1. *Traumatic Lesions:* Studies of the mental effects following traumatic lesions in the frontal lobes indicate that a certain group of changes appear with

TABLE I
FRONTAL LESIONS DUE TO TRAUMA

Author	Year	No. Cases	General Intellectual Deterioration	Euphoria Hyperactivity	Personality Alteration	Loss of Initiative	Depression Retardation	Memory Loss	Attention Defect ↑	Impairment of Abstraction ↓
Fritsch & Hitzig	1870	25	x						x	x
Ferrier	1886	57							x	
Bianchi	1894	—*			x					
Bolton	1902	—	x					x	x	x
Franz	1907	—	x							
Foerster	1918	—	x		x	x				
Isserlin	1918	—	x		x					
Poppelreuter	1918	—	x					x	x	
Donath	1923	—	x	x		x	x	x		
Feuchtwanger	1923	—		x	x		x			
Wimmer	1923	3						x		
Goldstein	1923	—		x		x			x	x
Sachs	1925	25				x		x		
Marcus	1926	7		x				x		
Holmes	1927	—		x	x		x			
Khoroshko	1929	5		x		x	x			
Kleist	1930	—		x	x		x			
Claude	1931	—								x
Grünthal	1936	17	x		x	x				x
Ruffin	1939	—	x	x		x	x	x		
TOTALS:			9	8	7	7	6	6	5	5

* Where the number of cases is not given, this either was not reported by the author or could not be obtained from an abstract of the original paper.

marked consistency. The frequency with which certain of the mental symptoms have been reported in the literature has been tabulated in an effort to determine whether a frontal lobe mental syndrome appears. These findings for traumatic lesions in the frontal region are summarized in Table I.

A group of difficulties most frequently referred to as "distractibility of attention" occurs with significant frequency in frontal lobe lesions. Fritsch and Hitzig (35) reported such a defect as early as 1870 in a study of 25 cases. Ferrier (25) found this to be a very common symptom in 57 cases which he carefully studied and later Bolton (9), Poppelreuter (106), and Goldstein (41) emphasized an inability to sustain attention in such cases.

Loss of initiative, lack of spontaneity, or apathy were first emphasized by Foerster (27) in 1918 when he had an opportunity to study numerous cases of war injury to the frontal region. Donath (22), Sachs (116), and Khoroshko (75) report these to be predominant mental changes and Goldstein (43), Ruffin (113), and Grünthal (48) observed these with marked frequency.

Personality alterations were first systematically noted by Bianchi (6) in 1894. Feuchtwanger (26), Holmes (63), Foerster (27), Isserlin (67), and Grünthal (48) have all emphasized the occurrence of general character changes in patients with frontal lobe lesions. Kleist (76) draws attention to the similarity of the personality changes in frontal lobe disease and general paresis.

"General intellectual deterioration" was the predominant change noted in the cases studied by Isserlin (67), Donath (22), and Foerster (27). This general defect is also reported by Fritsch and Hitzig (35), Bolton (9), Franz (29), Poppelreuter (106), Grünthal (48) and Ruffin (113). Opposed to these observations are those of Wimmer (137) and Feuchtwanger (26) who state that there is no detectable intellectual deficit in cases of frontal lobe lesions. They find the basic mental change to be affective rather than intellectual.

However, as early as 1870, Fritsch and Hitzig (35) reported an observable deficit in a specific aspect of the intellectual process. They noted a definite impairment of abstract thinking in a majority of 25 cases studied. Bolton (9) reported this symptom in 1902 and later Goldstein (42), Claude (15), and Grünthal (48) placed great emphasis upon this impairment. The subsequent work of Goldstein with reference to the more adequate detection of this defect arises out of these earlier observations and will be considered in greater detail in a later section.

Alterations in general psychomotor tempo and mood tone are perhaps the most frequently noted mental changes in all the cases studied. These changes appear capable of occurring either in the form of euphoria with hyperactivity and irritability or in the form of depression with general psychomotor retardation and dullness. Alterations in both directions have been observed by Feuchtwanger (26), Donath (22), Holmes (63), Khoroshko (75), Kleist (76), and Ruffin (113). Goldstein (41) and Marcus (85) observe the dominant picture to be one of euphoria or "Witzelsucht" with little mention of depression or retardation.

Other mental symptoms have been reported with lesions of the frontal region, but they have been reported with far less frequency than those mentioned above. Donath (22), Sachs (115), Wimmer (137), and Marcus (85) have all observed an impairment in recent memory functioning. On the other hand, Goldstein (41) and Grünthal (48) have failed to note the existence of any memory defect whatever. Bolton (9), Donath (22), and Poppelreuter (106) believe the memory defect to be a generalized one affecting both recent and remote memory functions. Sachs (115), however, finds that memory for remote events remains intact, but that recent memory function is markedly impaired. The confusion and disagreement with reference to the existence and nature of the memory loss can probably be attributed to the absence of any test techniques for its more

objective evaluation. Qualitative observation can scarcely suffice to detect impairment of this function in many cases.

2. *Frontal Lobe Tumor*: A review of the psychological changes occurring in cases of tumor of the frontal region reveals essentially the same picture as is found in cases of traumatic lesion. This may be seen by referring to Table II. However, there do appear to be some instances of displacement of emphasis.

The most frequently observed symptom in tumors is a euphoria with motor restlessness and irritability. This was first noted by Jastrowitz (68) in 1888 and by Oppenheim (100) in 1889. This symptom was later especially emphasized by Baruk (3), Moersch (91), Holmes (62), and Frazier (32) and was also frequently observed in studies by Lloyd (84), Dercum (20), Pfeifer (103), Nonne (96), Kennedy (71), Minski (89), Hyland and Botterell (66), and Shamboorov (122). Mood changes tending toward depression with psychomotor retardation is reported less frequently in cases of frontal tumor. However, Jastrowitz (68), Williamson (136), Lloyd (84), Moersch (91), Holmes (62), Kennedy (71), Shamboorov (122), and Hyland and Botterell (66) did note such a change, but somewhat less frequently than the euphoric type of reaction.

TABLE II
FRONTAL LOBE TUMOR

Author	Year	No. Cases	Euphoria Hyperactivity	Personality Alteration	Depression Retardation	General Intellectual Deterioration	Loss of Initiative	Memory Loss	Attention Defect
Jastrowitz	1888	—	x		x				
Oppenheim	1889	13	x						
Williamson	1891	50	x			x	x	x	x
Lloyd	1892	—	x	x	x		x		
Dercum	1902	3		x			x		
Pfeifer	1910	13	x	x		x	x		
Baruk	1926	30	x	x		x			
Nonne	1927	2	x	x	x				
Schwab	1927	—		x					
Moersch	1929	234	x	x	x	x	x	x	
Holmes	1931	—	x	x	x	x	x	x	x
Henry	1932	—							
Kennedy	1933	—	x	x	x	x			
Minski	1933	58	x	x	x	x		x	
Voris et al.	1935	314		x					
Frazier	1936	105	x	x			x		x
Hyland & Botterell	1937	33	x	x	x				
Shamboorov	1938	20	x		x	x			x
Duss	1939	30	x	x			x	x	
TOTALS:			15	14	10	8	8	5	4

* Where the number of cases is not given, this either was not reported by the author or could not be obtained from an abstract of the original paper.

Personality changes were observed as often in cases of brain tumor as they were in traumatic lesions of this same area. Schwab (121), Hyland and Botterell (66), and Voris, Adson, and Moersch (131) have all emphasized such alterations in the general personality structure as the basic mental symptom in frontal lobe tumors. Observations of such cases by Dercum (20), Baruk (3), Nonne (96), Holmes (62), Kennedy (71), Minski (89), and Frazier (32) have served to point out further the frequency with which such alterations of personality occur.

"General intellectual deterioration" is reported by Williamson (136), Pfeifer (103), Baruk (3), and Minski (89) in their studies of frontal lobe tumor. Holmes (62), Kennedy (71), and Shamboorov (122) place particular emphasis upon the general intellectual defect which they observed. However, this general change is reported far less frequently in tumors of the frontal region than in cases of other traumatic lesions of the same cortical area.

Distractibility of attention is mentioned only in the studies of Williamson (136), Holmes (62), Shamboorov (122), and Frazier (32) and loss of spontaneity or loss of initiative seems to occur less frequently in tumors than in cases of other lesions of the frontal lobes. However, Williamson (136), Dercum (20), Pfeifer (103), Moersch (91), Holmes (62), and Shamboorov (122) have all observed such apathy in their tumor studies. A general memory defect is reported by Williamson (136), Moersch (91), and Minski (89) while Holmes (62) notes that an impairment of recent memory function constitutes the only memory weakness in frontal tumors. The literature on tumors of the frontal region makes no mention of a specific disturbance in abstract thinking which was noted quite frequently in other frontal lobe lesions.

In a thorough study of 30 cases of tumor of the orbital surface of the frontal region, Duss (23) has placed great emphasis upon alterations in the personality of the patients. The nature of these changes is said to be related to the previous personality patterns in individual cases. Duss localizes the personality alterations in the orbital surface of the frontal lobes since they always appear in the very early stages of the disease. However, with progressive growth of the neoplasm, other regions of the frontal lobes become implicated so that loss of spontaneity and apathy become dominant symptoms and frequently conceal the earlier and more fundamental personality changes which Duss believes are specific to the orbital region.

In general, the symptoms most often observed in frontal lobe tumors are essentially the same as those noted in traumatic lesions of the frontal region. However, several of the alterations noted do not appear as consistently in cases of tumor as they do in traumatic lesions. In general, however, the mental changes emphasized are the same in both types of frontal lobe disturbance.

3. *Frontal Lobe Ablation:* The final form of frontal lobe disorder to be considered is covered in a group of qualitative studies of the mental changes following ablation of one or both of the frontal lobes. Since the animal studies in this field are not included, the number of observations is very limited. Further, in the few opportunities that have occurred for observation of the effects of frontal lobectomy in human subjects, mental or psychological changes have rarely been detected.

a. *Unilateral Ablation:* In 1928, Dandy (18) found no mental deficits of significance in a case of removal of the left frontal lobe. O'Brien (98) reports a case of right frontal lobectomy in which qualitative observation yielded no discernible impairment. In 1934, Penfield and Evans (101) reported two cases of unilateral frontal lobectomy. The first case underwent removal of the right frontal lobe and no mental changes were noted. The second case reported was that of an excision of the dominant or left frontal lobe. Clinical observation of this patient following operation revealed a slight loss of initiative

and a notable impairment of abstract thinking. No other significant psychological alterations were seen. In 1937, Rowe (111) reported a case of right frontal lobectomy where a recent memory defect and some emotional lability were observed post-operatively. At the same time, Jefferson (69) had opportunity to study carefully six cases of unilateral frontal lobectomy. Three of the cases were right frontal ablations and three involved removal of the left frontal lobe. Concerted study and observation revealed no psychological changes or defects in any of the patients post-operatively. Jefferson's study served to point out that unilateral lobectomy in the frontal region produces no qualitatively observable mental changes regardless of the laterality of the ablation. Removal of the so-called dominant frontal lobe resulted in no discernible impairment of mental functioning. However, in instances of bilateral removal of the frontal lobes involving the corpus callosum, there does appear to be evidence of mental symptomatology following the surgical procedure.

In 1938, Messimy and German (88) observed psychological symptoms in three cases of right or non-dominant pre-frontal lobectomy. An attitude of hostility was noted in all cases. Carelessness, irritability, and occasional euphoria were present and one patient reported visual and auditory hallucinations following lobectomy.

b. *Bilateral Ablation:* In 1935, Ackerly (1) described a case of frontal lobectomy involving removal of both lobes. The symptoms were said to be of a mild nature, but there was a definite tendency toward occasional euphoria along with a peculiar attention disturbance. Following bilateral lobectomy, the patient showed a marked and consistent tendency toward decreased distractibility. When performing certain tasks, she paid little attention to what normally should have been distracting stimuli. However, Ackerly states that the patient manifested no detectable intellectual deterioration, no memory defect, nor any loss of spontaneity. These findings are consistent with those reported by Hunt and Nichols (65) in a study of a case of partial bilateral frontal lobectomy.

In 1936, Brickner (12) reported a concerted qualitative study of a case of bilateral frontal lobectomy with very marked changes of a psychological nature. The psychological studies which this patient underwent will be discussed in a later section. However, he was observed for about six years and there are very few life situations in which his behavior and verbalizations have not been recorded. The study is a most complete and adequate one and reveals certain striking mental changes. Following operation, the patient showed primarily a marked distractibility of attention, euphoria, loss of initiative, possible intellectual deterioration, and particularly marked personality changes in the direction of puerile boastfulness with asocial and immoral speech and behavior. An impairment of abstract thinking was noted by Brickner and was referred to as "an inability to synthesize mental engrams." This defect is postulated as the basic frontal lobe mental deficit by the author and is said to be fundamental to all the psychological manifestations which the patient demonstrated. In 1939, Brickner (13) reported a follow-up study upon this patient which revealed no essential or significant change in his mental symptoms. There was, however, some slight decrease in the severity of the symptoms, but they still persisted.

Freeman and Watts (33) believe the basic function of the frontal region to be concerned with the projection of the individual into the future. With this area intact, the individual is able to foresee and predict the results of his behavior with reference to his specific goals. All other suggested functions of the frontal lobes are said to be subsumed under this broad function and are but means whereby projection into the future takes place. This conclusion was reached after a study of 48 cases of bilateral frontal lobotomy in an attempt to relieve certain neurotic and psychotic symptoms. The authors state:

The frontal lobes are not centers of intelligence nor of emotion, nor are they directly concerned with the energy drive of the individual. They assemble the available data,

synthesize them, plan a course of action with the ideal in mind, and, equipped with energy of response and with appropriate affective tone, project the individual into the future, direct him toward his goal—and criticize his shortcomings.

More recently Freeman and Watts (34) state that the frontal lobes serve to maintain appropriate affective tone in relation to consciousness of the self. The therapeutic mechanism involved in frontal lobotomy is said to consist of the blunting effect upon the affective tone in this respect. Such a release of strong emotional attitudes with reference to the ego would account for the beneficial therapeutic effects of lobotomy operations in obsessive, depressive, and hypochondriacal states.

Unfortunately, the number of patients undergoing frontal region ablation is limited and opportunities for post-operative study have been restricted. In general, however, the clinico-descriptive studies of these patients do permit some broad generalizations. It appears that in most instances, qualitative observation does not reveal any marked detectable mental impairment in unilateral frontal lobectomy whether it be the dominant or non-dominant lobe which has been removed. Nevertheless, Penfield and Evans (101), Rowe (111), and Messimy and German (88) observed definite mental alterations in their cases of unilateral removal. With reference to bilateral removal of the frontal lobes, both Ackerly (1) and Brickner (12) reported psychological changes in their studies. In those observations where psychological changes were noted, the symptoms appear to be similar to those seen in cases of traumatic lesions and tumors in the frontal region. However, in the cases of frontal excision, there seems to be a marked decrease in both the consistency of appearance and the severity of the mental symptomatology.

On the basis of the qualitative studies of the psychic symptoms of frontal lobe pathology, it might be possible to formulate a general frontal-lobe mental syndrome. However, before such an attempt is made, it seems necessary to consider the descriptive studies of disturbances in other regions of the cortex to determine whether or not such mental changes are specific to the frontal region of the brain.

B. The Temporal Cortex

On the basis of the number of studies in the literature dealing with the mental changes in different cortical areas, one may surmise that psychological manifestations are far less frequent in disorders involving the temporal region than in cases of frontal organic brain disease.* The majority of the qualitative studies of the temporal regions have been chiefly concerned with various types of sensory dysfunction which appear to be frequently related to temporal lesions or tumors. Most studies have been directed toward the problems of auditory and visual agnosia which are frequent symptoms in disease of this area of the brain. Also, the presence of gustatory and olfactory hallucinatory phenomena often occurring with epileptiform seizures have received much emphasis and study, possibly at the expense of other mental alterations which have been observed by some investigators. There are a few descriptive studies which do report certain psychological changes in disease of the temporal region and these will be summarized in an attempt to establish the presence of mental symptoms which may be referred specifically to brain disease of the temporal lobes.

1. *Temporal Lobe Tumor:* The most frequent mental symptom associated with tumor of the temporal region appears to be a visual disturbance, usually of a hallucinatory

* Since it was necessary to place some arbitrary restrictions upon the scope of this review, all studies dealing with the problem of aphasia and organic brain disease have been omitted. In many instances, it appears that aphasic disturbances are closely related to symptoms described above.

nature. The hallucinatory experiences also frequently tend to be of an olfactory and gustatory kind and are generally found to precede some sort of epileptiform fit, usually of the uncinata or Jacksonian type. Martel and Vincent (87), Kennedy (71), Kolodny (79), Henry (60), Stone (125), Lemke (82), and Keschner, Bender, and Strauss (72) have found such symptoms in cases of temporal lobe tumor.

Kolodny (79) studied 38 cases of temporal lobe tumor and found a definite memory loss in 19 of the cases. The memory defect appears to be more striking in cases of left-sided tumor than in right-sided involvement. Also, the memory defect is said to involve memory for both recent and remote events as opposed to the predominance of the recent memory defect in cases of frontal lobe tumor.

Of the 110 cases reviewed and studied by Keschner, Bender, and Strauss (72), 50 per cent showed some type of memory disturbance. According to the authors, the defect lay primarily in the spheres of "retention and recollection" while "recognition" was found to be the function least affected. Since memory impairment is found with equal frequency in frontal region tumors, the writers conclude that memory function is probably related to the structural integrity of the entire cortex. They also suggest the development of adequate non-language tests of memory so that the presence of quite intact memory ability will not be obscured by aphasic disturbances often noted in these cases.

Moersch (91) observed a memory defect in several of 22 cases of temporal tumor, but does not further qualify the exact nature of the impairment nor its severity. Studies by Golla (46) and by Lemke (82) also make vague reference to a memory deficit in such cases. Minski (89) studied a number of patients with left temporal tumor and observed that recent memory was initially affected, but in the later stages of the growth, remote memory also became involved and the impairment appeared to be a generalized one. The author believes this to be characteristic of the typical memory loss in organic brain disease.

Distractibility of attention was noted in cases of temporal tumor by Knapp (78), Holmes (62), Moersch (91), and Keschner, Bender, and Strauss (72). However, this symptom does not receive great emphasis and was apparently not observed in many of the qualitative studies. Loss of initiative or lack of spontaneity is reported by Kolodny (79), Golla (46), Keschner, Bender, and Strauss (72), Moersch (91), Schuster (120), and Minski (89) in their observations upon patients with temporal tumor. Personality alterations similar to those observed in cases of frontal region tumor are reported and emphasized by Kolodny (79). However, he finds that the mental manifestations do not occur with the marked frequency with which they are seen in frontal tumors and that they also appear in later stages of the disease process in temporal growths. Keschner, Bender, and Strauss (72) noted personality changes as frequently in temporal tumors as in frontal lobe tumors and concluded that such a symptom was therefore of no localizing value. Minski (89) also reported such changes and felt that their occurrence depended primarily upon the rate of growth of the tumor and the previous personality rather than upon any specific localization of the tumor within the cortex. Stone (125), Kennedy (71), Knapp (78), Brain (10), and Moersch (91) all report the occurrence of personality changes in their cases of temporal tumor.

Changes in mood tone and psychomotor tempo are also reported in cases of temporal tumor, but to a far lesser degree and frequency when compared with their occurrence in frontal lobe tumors. Kolodny (79), Minski (89), Keschner, Bender, and Strauss (72), and Moersch (91) all make mention of such manifestations which apparently have been noted as tending toward either euphoria with hyperactivity or toward slight depression with psychomotor retardation. "General intellectual deterioration" is described in some cases by Minski (89), Moersch (91), Lemke (82), Keschner, Bender, and Strauss (72), and Torkildsen (129). Minski (89) more specifically defines the defect as one affecting primarily "judgment, critical faculty, and discrimination." However, with reference to this symptom as well as in the case of reported memory defects, one must be very cau-

tious in interpreting the nature of the memory or intellectual defect. The very frequent occurrence of aphasic conditions in temporal lobe involvement may confuse the picture unless one follows the suggestion of Marie (86) in believing that sensory aphasia is but a manifestation of a general intellectual defect. The need in this problem is one of developing more accurate and discriminating non-language or performance tests devices and techniques. This would appear to be the only manner whereby the relationship between aphasia and intellectual impairment can be tested and accurately described.

2. *Traumatic Lesions—Ablation*: In the case of lesions of the temporal lobes other than of those associated with tumors as described above, there are relatively very few clinical descriptions of mental symptomatology. In general, where they have been noted, they are basically the same as those observed in cases of tumor, except that possibly there is a lesser degree of severity. Again, in the case of ablation or temporal lobectomy, the number of studies reported which deal with the psychological status of the patient are very limited. Fox and German (28) observed marked euphoria, emotional instability, and some loss of initiative in their cases. Nielsen and Raney (95) noted a generalized memory defect, but emphasized the lack of any personality changes in reporting the results of their observations. Aphasic disturbances were almost always observed in such cases. In short, mental changes appear to be most frequent and most marked in tumor of the temporal lobes. Other forms of disease in this region of the brain do not seem to produce mental changes with the same frequency or severity. However, one must be aware of the limited number of observations of the mental symptoms in patients with traumatic lesions or excision of the temporal cortex. Nevertheless, certain conclusions do seem to be possible since the absence of reports of such observations in the literature would suggest that such symptoms were not noted and therefore probably were not present to any consistent degree.

It appears that the frequency of appearance of psychological alterations in temporal involvement is far less than that found in frontal region disease. Nevertheless, where such mental manifestations have been observed, it is noteworthy that they are much the same as the mental changes described in connection with frontal lobe disease. The inevitable question which arises involves the degree and incidence of the cortical spread of dysfunction or the "diachisis effect" suggested by von Monakow (92). Brain (10) states that the greatest difficulty in localization of brain damage lies in the fact that too often the local symptoms cannot be separated from the secondary or more general symptoms which result from generalized increased intracranial pressure. Such a diffusion of damage within the cortex may well explain the overlapping of the mental symptomatology in frontal and temporal lobe disease when mental changes have occurred in the latter region. The fact that mental symptoms appear later in the disease process in temporal region involvement and are also more common in temporal tumor, where increased intracranial pressure is most common, are consistent with such an explanation. That is, it appears that temporal involvement may secondarily produce organic changes in the frontal region either through the production of scar tissue in that area or through generalized increased intracranial pressure affecting the frontal area of the cortex.

C. The Parietal and Occipital Cortices

Brain disease localized within the parietal or occipital regions is not found to be related to any consistent psychological changes with reference to either intellectual or affective functioning. The parietal area of the cortex contains the great somesthetic area and damage in this region is generally correlated with various types of sensory-perceptive disturbances. Psychophysiological functions

show numerous and variegated types of impairment. Disturbances involve faulty discrimination of intensities of pain, touch, and temperature stimuli along with an inability to localize the stimuli spatially. Patients show impaired two-point discrimination and are often unable to recognize objects in terms of their weight, size, form, or texture, i.e., they display astereognosis. Various types of aphasic disturbances have also been observed in cases of parietal brain disease.

Henry (60) has studied several cases of tumor of the parietal lobes and concludes that there are no mental changes which are of any localizing value. Hardwick (53) reports no intellectual defect in a thorough study of a patient with parietal lobe injury. However, disturbances of the body scheme or a lack of awareness of parts of the body has been reported in cases of parietal damage with very great frequency and consistency. Such a disturbance has been emphasized by Schilder (118), Hoff and Pözl (61), Gerstmann (37), Gurewitsch (50), Krapf and Courtis (80), and Wagner (133). Related to this general disturbance of the body scheme is a peculiar inability to discriminate between individual fingers of the hand. Gerstmann (37) and Schilder (118) have observed finger agnosia in several cases of parietal lobe involvement. Alexic, agraphia, and apractic disturbances also appear to occur with significant frequency.

Other symptoms less frequently observed in parietal lobe disease include a rather specific defect with reference to the performance of relatively simple arithmetical calculations. These have been emphasized by Gerstmann (37) and Krapf and Courtis (80). Engerth (24) and Schilder (118) speak of a specific impairment of tri-dimensional vision of parietal brain disease, the former also finding a peculiar inability in the use of blue colors. Further specificity of localization of psychological function is attempted by Stief and Csajaghy (124) who seek to localize mirror-writing in the left parietal lobe. Gerstmann (37) believes that finger agnosia, right and left disorientation, agraphia, and acalculia occur with such frequency that they may be grouped together to constitute an interparietal syndrome.

In general, one finds that the alterations occurring with parietal pathology are generally of a psychophysiological rather than a more strictly psychological nature. Mental changes such as were observed in cases of frontal and temporal lobe damage are not seen with any consistency. However, there does remain the problem of the application of psychophysical methodologies to the sensory-perceptive defects qualitatively observed in parietal cases with an end toward more accurate and objective measurement of the extent and nature of the defects which have been described clinically.

For purposes of the present review of symptoms, the occipital region can be relatively rapidly dismissed. The literature contains no mention of the occurrence of mental changes of an affective or intellectual kind with occipital lobe pathology.

Penfield and Evans (101) specifically state that there is no intellectual disturbance in such cases. In general, disturbances within the visual sphere constitute the most frequently observed symptom. Visual hallucinatory experiences have been noted rather consistently and are reported by Henry (60), Balado, Adroque, and Franke (2), Horrax and Putnam (64), and Kessel (73). Nielsen and Von Hagen (94) found astereognosis in all of three patients with lesions in the occipital region.

D. Conclusions From the Qualitative Studies

Studies of the mental phenomena occurring with frontal lobe pathology demonstrate that there are certain psychological symptoms which occur pre-

dominantly in instances of tumor and other traumatic lesions with such marked consistency that they may be tentatively considered as a frontal lobe mental syndrome. It has also been found that similar symptoms occur very frequently in cases of temporal lobe tumor, but less frequently in instances of traumatic lesion or ablation of the temporal lobes. With the exception of tumors, the mental changes in temporal brain disease are milder in degree and occur later in the disease process than is the case in involvement of the frontal cortex. However, the mental symptoms which occur in pathology of the frontal and temporal regions are essentially the same. These manifestations include distractibility of attention, loss of spontaneity, alterations in the general intellectual deterioration, memory loss, and changes in mood tone and psychomotor tempo. These symptoms are not reported in cases of parietal and occipital brain damage. In the former, the symptoms are primarily psychophysical defects while the latter situation gives rise to disturbances mainly affecting the visual sphere. In neither case are the symptoms strictly psychological.

The overlapping of the mental changes in frontal and temporal lobe disease has been attributed to diffusion of damage within the cortex. It has been suggested that the psychological changes reported above are due either to focal or secondary involvement of the frontal cortex. Focal temporal lobe disease may give rise to psychological changes by virtue of secondary implication of the frontal lobes by means of a spread of the pathological process. This is consistent with the finding that psychological changes in focal temporal lobe disease usually occur later in the disease process than they do in primary frontal lobe involvement.

Although mental symptoms have only rarely been noted in cases of unilateral frontal lobectomy, it is of considerable importance that when such manifestations were observed in such cases, these have been essentially the same as those mentioned above. With the exception of Brickner's (12) study, symptoms noted in bilateral as well as unilateral frontal lobectomy cases have generally tended to be much milder in degree than in cases of tumor and other lesions of the frontal cortex.

Brickner (14) has suggested an explanation for the relative absence of mental changes in cases of unilateral frontal lobectomy. This hypothesis appears to involve two supplementary principles. It would seem that psychological function is bilaterally represented in each of the two frontal lobes. Therefore, the absence of psychological changes following the removal of one of the frontal lobes may be explained in terms of the capacity for one lobe to take over the functions of the other. Anatomically, this would assume an intact corpus callosum which serves to integrate both frontal lobes. In short, the absence of some frontal region tissue does not produce observable mental changes because of the existence of a mechanism for a functional inter-lobular transfer. However, it appears further that such a functional transfer cannot occur in the presence of pathological tissue such as are produced by tumors and other frontal lesions. In the latter cases, the severity of the psychological alterations was most marked regardless of the laterality of the pathology. Symptoms are most severe with increased intracranial pressure and scar tissue present in the frontal region. In most lobectomy operations, attempts are made to remove all scar tissue and, of course, intracranial pressure. The conclusion toward which one is inevitably led is that the presence of pathological frontal tissue results in positive mental symptomatology whereas the absence of frontal tissue as is the case in unilateral frontal lobectomy gives rise to negative symptomatology because of the existence of such a mechanism for functional transference between the two frontal lobes.

III. THE APPLICATION OF PSYCHOLOGICAL TEST TECHNIQUES IN ORGANIC BRAIN DISEASE

In recent years, clinical psychologists have shown increasing interest in the application of test procedures to the problems of organic brain pathology. The two fundamental factors which may serve to explain the advent of the psychologist into this field might well be the gaining interest in the psychological changes associated with brain pathology along with the attempts of psychologists to attain higher specialization and specificity in terms of test development and application. Numerous instances of traditional fixations in this developmental process are still seen, however. Conventional methods are clung to despite repeated demonstrations of their inadequacies. This section will be concerned with the presentation of the status and development of the use of psychological test techniques in organic brain disease.

Studies along these lines may be grouped into two broad descriptive categories.

1. Those investigations of functional deficit in organic cases which have employed only the conventional or gross tests of general intelligence or performance ability. These will be referred to as the studies utilizing *unspecialized* test techniques.

2. Those studies which utilize *specialized* test techniques. These latter studies involve attempts to analyze the exact nature of the intellectual defect and also include attempts to measure the existence of psychological symptoms other than alterations in the intellectual sphere.

A. The Use of Unspecialized Tests

"General intellectual deterioration" appears to have been one of the most frequently observed symptoms in cases of frontal and temporal tumors and other lesions. This has resulted in a number of psychological studies in which the conventional tests of general intelligence have been employed. All of the other qualitatively reported mental changes tended to be ignored since the technical devices required for measuring general intelligence were more readily available. In general, these studies consist of psychological examinations before and after the removal of brain tissue. The results are then compared with the end of determining the effect of surgical removal of brain tissue upon general intellectual functioning.

These studies have generally utilized the Stanford-Binet scale along with occasional performance test scales. The fundamental conclusion to be drawn from such investigations is that no deterioration of general intellectual functioning can be found following the surgical ablation of cortical tissue. Studies of this type have been made by Hebb (57) (58) and Hebb and Penfield (59).

Hebb (57) studied four cases of extensive ablation of the left frontal lobe. The revised Stanford-Binet test was utilized to determine the general intellectual level and the Arthur Performance Scale and the McGill Revision of the Army Beta test were employed to compare language with non-language test performance. The author concluded that the effect of left unilateral frontal lobectomy upon intelligence test performance is practically negligible. Pre- and post-operative tests were made upon but one of the four cases; in this there was no change in the IQ after operation. The other three cases were only examined post-operatively and were found to be above average.

Hebb and Penfield (59) report test results before and after operation in a case of extensive bilateral removal from the frontal lobes to remove scar tissue following a traumatic brain injury. A comparison of the Stanford-Binet pre- and post-operative results indicates an average gain of 10.8 IQ points when the four post-operative tests are com-

pared with the test results before surgery. The improvement upon the performance tests after operation is even more striking. Although the effect of practice must be considered in interpreting these test results, it is significant that no lowering of the intellectual level can be inferred.

Hebb (58) reports a case of removal of the right temporal lobe. The patient attained a Stanford-Binet IQ (Form L) of 113 following operation. No tests were administered before ablation in this case. However, the writer concludes that retention of verbal intelligence following temporal ablation does not preclude the possibility of defects in other psychological abilities. This patient showed a marked and consistent impairment upon all the performance or non-language tests administered. Hebb attributes this to a disturbance of form perception, both visual and non-visual. The discrepancy between the results of verbal and non-verbal tests of intelligence is the most striking feature of this particular case.

Lidz (83) reports pre- and post-operative Stanford-Binet and performance test results in a case of unilateral frontal lobectomy for the removal of a tumor. Again, no impairment of formal intelligence can be found following surgery. Ackerly (1) reports psychometric findings in a two-year post-operative study of a case in which there was extensive removal of both frontal lobes. No quantitative data are presented, but the author concludes that Stanford-Binet examination of intelligence demonstrates no functional defect and that the results of "three memory tests" demonstrate no impairment whatever in that sphere. The only possible disturbance found was a slow performance upon the Arthur Performance Scale, but the quality of the test performance was good. Rowe (111) found a Stanford-Binet IQ of 115 in a case of removal of the entire right cerebral hemisphere. No tests were made before hemispherectomy. The author also concludes that such extensive removal of brain tissue results in no impairment of general intelligence, although he does state that there is some disturbance in recent memory functioning.

Worchel and Lyerly (138) were able to obtain pre- and post-operative revised Stanford-Binet results from five of their group of thirteen patients who underwent bilateral pre-frontal lobotomy operations in a therapeutic attempt to relieve conditions of agitated depression. The conclusions of the authors are well expressed in their own words:

An interesting problem presented by such operative procedure concerns the intellectual functions of the prefrontal lobes. The question naturally arises whether cutting nearly all the association fibres in the white matter of both prefrontal lobes affects certain intellectual capacities. Only precise psychological testing with adequate controls and strict adherence to the scientific method can yield valid answers. . . . In all these cases, the reexaminations after the operation yielded almost identical results to each individual test item as compared to the original tests prior to operation. The slight changes were not significant or consistent.

It appears that the findings of Worchel and Lyerly (138) are especially significant since one may assume that their patients were not suffering from any type of organic brain disease when the pre-operative test results were obtained. Their cases were diagnosed as agitated depression which is generally assumed to be a "functional" mental disorder without organic basis. On the other hand, the studies of Hebb (57), Hebb and Penfield (59), and Lidz (83) are of a nature that is different since they are actually comparing intelligence test performance in the presence of affected brain tissue with intelligence test performance in the absence of specific brain tissue.

Further evidence of the absence of signs of general intellectual deterioration following removal of cerebral tissue is seen in the test results reported by Halstead (52). He gave the Stanford-Binet test to some of his patients and was able to obtain pre- and post-operative comparisons upon a few of the cases. None of these showed any notable alteration in the IQ following operation.

These findings with test instruments appear to demonstrate very consistently that conventional tests of general intelligence do not demonstrate any loss of functional ability in patients who have had cerebral tissue ablated in the removal of pre-existing brain pathology. The majority of these studies have been concerned with the frontal region of the cortex. In fact, some of the cases actually show a slight gain in post-operative test results. These general findings are consistent with the explanatory concept developed earlier where it was assumed that there might be a transfer of function from one frontal lobe to the other only in the absence of pathological tissue or absence of increased intracranial pressure. Under such conditions, one would not expect any loss of mental ability following the removal of diseased tissue or pressure. This is precisely what has been found in most of these studies. In the cases of Worchel and Lyster (138) where prefrontal lobotomy was performed bilaterally in patients presumably without organic brain pathology, the absence of intellectual deficit after operation seems amenable to similar explanation. Assuming the excision of a very small amount of frontal tissue upon both sides without significant scar tissue or without pressure, there would still be sufficient frontal lobe tissue present to permit inter-lobular transfer and one might also conceive of possible intra-lobular functional transfer. This could well occur since all association fibres were not severed in the course of the operation. In such a case, one again would not expect to find notable loss of ability upon tests of general or formal intelligence.

Consistent with this interpretation are the intelligence test findings reported by Brickner (12) in the famous case of Joe A. who underwent complete removal of both frontal lobes. An evaluation of a series of tests of formal intellectual ability administered post-operatively in terms of his previous educational and vocational history definitely showed marked functional loss directly after lobectomy. Although there has been a gradual progressive gain in scores with increased post-operative temporal intervals, one can hardly say that this patient has returned to his normal intellectual level. Here one sees a residual intellectual deficit in a case of complete ablation of both frontal lobes.

The results of the psychological investigations employing unspecialized tests of formal intellectual ability lead to one of two paradoxical conclusions. One might accept the findings reviewed above and agree that there is no observable or demonstrable intellectual defect that occurs in cases where there is the structural potentiality for a transference of functional ability. To put it specifically, it may be said that there is no detectable alteration in the intelligence of such patients. The second possible conclusion, possibly more tenable, would hold that disease or removal of cortical tissue always results in some deficit in the intellectual sphere, but that this functional loss cannot be demonstrated through tests of general and formal intelligence. In this view, the nature of the intellectual defect would be conceived of as being a highly subtle and elusive one which requires the breakdown of "general intelligence" into its component parts. Such an analysis of intellectual functioning must be made in these cases before one can conclude with certainty that there is no loss of intellectual ability following even unilateral frontal lobectomy.

The problem which presents itself is one which can only be approached through the development and use of psychological tests of a specialized nature. The techniques should be based upon the analysis of the factors which comprise "general intelligence." Beginnings in this direction have been made. Although they seem to spring from widely divergent theoretical origins, deeper study

demonstrates marked similarity among the investigations. The remainder of this review will be devoted to a study of those psychological investigations of organic brain disease which have endeavored to utilize specialized tests of intellectual abilities as well as other mental functions.

B. The Use of Specialized Tests

1. *Abstract Thinking:* As early as 1870, Fritsch and Hitzig (35) reported a specific aspect of the intellectual process which they qualitatively observed to be impaired in several of 25 cases of traumatic lesions in the frontal cortex. There appeared to be a particular loss of the ability to think abstractly. Later, this defect was reported by Bolton (9), Claude (15), and Grünthal (48). Goldstein was especially struck by this loss of abstract thinking ability and studies by Goldstein and Gelb (40) and by Gelb and Goldstein (36) gave rise to the first specialized psychological approach to this problem with specific test methodologies.

Goldstein and his colleagues were basically interested in the problem of amnesic aphasia for colors in patients with pathology in the frontal region. The large number of war injuries at that time gave them access to numerous cases of traumatic lesions. Their test procedure consisted of the use of the Holmgren Wools which is composed of skeins of various colors and shades. During the original studies of amnesic aphasia in organic cases, the patients were required to sort certain of the skeins together. A stimulus color was presented and subjects were instructed to sort all colors together which belonged with the original stimulus color. The most striking finding of these studies was the very concrete and constricted approach to the problem on the part of the organic patients. They were unable to generalize or abstract in terms of the stimulus color and sorted only a few shades which were practically identical with the stimulus color or shade. Normals do not show this constricted type of sorting behavior. Goldstein concluded that the organic patient can consider but one attribute of a color at a time such as either hue, brightness, or saturation and is also unable to shift sorting bases from one attribute to another. As a result, the patient is limited to a "concrete attitude" because of an impairment of generalization or abstraction ability. He has lost the ability to abstract because he is unable to take simultaneous account of a number of attributes in the situation. Later studies by Goldstein (42, 43) have served to corroborate this finding. He believes this defect to be specific to frontal lobe damage and states that it may be demonstrated in general cortical deterioration since diffusion of brain damage will always affect the frontal region. The author further believes that there is a direct relationship between the degree to which abstract thinking is developed and its susceptibility to impairment in the presence of organic brain disease.

In 1923, von Kuenburg (81) developed a test of abstraction ability of a rather simple nature. She also reports a definite impairment of this function in patients with frontal lobe injury and aphasia. The test procedure involves showing subjects a group of meaningless figures for a very short temporal interval. Immediately afterward, a number of other figures containing some of the figures which had previously been demonstrated are placed before the subjects and they are required to identify those figures which had been demonstrated previously and also to locate them spatially. The abstraction aspect of this technique, however, is somewhat difficult to detect. Mainly, this test demands the integrity of recent memory function along with rapidity of the process of attention and perception. The element of abstraction is involved in the selection of those figures which had been seen to the exclusion of those which had not. Success in such a task demands rapid as well as simultaneous consideration of several of the attributes of the figures.

Rylander (114) has used this test in a later study and it will be further considered in a later portion of this section.

Attempts to get at the impairment of abstract thinking in organic brain injury continued to gain momentum with continued interest in the sorting test technique. In 1927, Weigl (134) published some fragmentary data upon a small number of organic cases and also devised the first object sorting test. His first test consisted of four circles, four squares, and four triangles, each of which appeared in red, green, yellow, and blue. The subjects were thus faced with two possible sorting alternatives. Sorting could be performed according to form or color. However, Weigl was not so much interested in the ability of the patients to sort according to form or color, but was particularly concerned over the inability of his patients to shift their sorting bases from the one to the other. Goldstein had previously mentioned that patients with organic brain disease could be concerned with but one attribute of a problem situation at a time and Weigl's technique was designed to determine whether patients could shift the determinant of their sorting behavior. Although the number of cases studied by Weigl is very limited, in general, his results corroborate the notions of Goldstein and Gelb (40). He further employed a group of normal controls and found their behavior to differ from that of patients. Weigl states that the test must receive qualitative interpretation since very frequently patients are able to shift their sorting attitudes upon the test. However, he cites a hierarchy of various determinants of shifting which range from very concrete to very abstract conditions. It is therefore not only important to note whether or not a shift in the sorting basis occurs, but one must also seek to analyze the factors and situational setting which give rise to the alteration in sorting attributes.

Weigl (134) also utilized an object sorting test consisting of 30 common objects inherently amenable to variegated types of organization or grouping. They could be grouped according to similarity of color, double occurrence, form, or use. A rather "large" number of patients with cerebral lesions were given this test. Again, Weigl found that although patients may be quite able initially to sort in a satisfactory manner, they are unable to shift adequately from one set of organizational factors to another set. The patients are basically concerned only with the practical or "concrete" use of the objects; they do not show the flexibility of the normal adults. Their sorting attitudes are constricted, limited to a single set of experimental organizational factors, and generally concrete in nature. Weigl also found a difference between his patient group and a group of children. Whereas the children were far more concrete in their behavior than the normal adults, their sorting was always changing and taking on new relationships and characteristics. They were constantly modifying their sorting performances and making naive attempts to shift among the several possible sorting categories. This activity differed from the constriction and monotonous type of behavior generally manifested by the patients. From these results we may conclude that the patient with organic brain damage reveals an impairment of abstract thinking as demonstrated by the sorting test techniques. Weigl finds further that this defect does not consist of a regression to a more infantile type of abstract behavior, but is rather a definite pathological invasion of the abstraction process.

Goldstein (44) maintains that the "concrete attitude" to which the patient with brain injury is relegated is the basic personality defect in such cases. Other organic manifestations of a less general character are for the most part but embellishments of the more primary and fundamental defect in the ability to think abstractly. In recent years, associates of Goldstein have continued in the application of psychological test techniques to the problem of organic brain disease in terms of this same basic theoretical framework. However, attempts were made to get at the abstraction process in patients with organic brain disease with the use of test devices other than the sorting technique.

Nadel (93) compared the results on a battery of tests of a group of fifteen patients whom competent neurologists had diagnosed to be suffering from damage in either the left or both frontal lobes. The results obtained with these patients were compared with the findings on a control group of patients diagnosed as suffering from organic brain involvement in some region other than the frontal area. The patients in both groups were clinically stated to be mentally deteriorated. Nadel employed, first, a modification of the Kohs Block Design Test which was graded in terms of differential levels of abstraction requirement. The second test consisted of the Goldstein adaptation of the Holmgren Wools. This test has already been described. Thirdly, the Stick Test was utilized. This consists of the manipulation of a group of small sticks in the exact reproduction of a sample figure exposed for a limited period of time. The period of exposure depends upon the relative difficulty of the figure in terms of the degree of abstraction required. Finally, the Manikin and Feature Profile of the Pintner-Paterson Performance Series were presented to the patients. These latter tests are at present components of the Object Assembly test item of the Bellevue Intelligence Scale.

In general, all the tests demonstrated differences between the patients with frontal lobe involvement and the patients with brain damage in other regions of the cortex. The patient with frontal lobe disease can utilize only the simplest approach to these problems. He is successful only with the concrete and the familiar. He is unable to shift from a concrete to a more abstract set and has lost the "categorical attitude." He is totally unable to formalize higher generalizations. These are the actual and the implied conclusions of Nadel.

It appears that the basic loss of abstracting ability in frontal region dysfunction can be approached and demonstrated with techniques other than sorting tests. The development of test methodology would seem to be dependent largely upon the definition of abstracting ability. Abstraction appears to consist of two fundamental component processes. First, there is extraction of pertinent detail from the whole and secondly, there must occur a new synthesis and generalization of parts into a new whole. The sorting test techniques as well as Nadel's techniques make demands upon both of these basic functional abilities. It matters little upon which of these component processes the emphasis is placed since it appears as an empirical fact that a defect in one always presupposes an impairment of the other.

In 1939, Rylander (114) presented the results of a concerted and exhaustive psychological study of 32 cases of partial frontal-lobe excision for the removal of brain tumors. In 20 of the cases, the operation involved the left frontal lobe and in 12 cases the right frontal lobe was affected. An extensive battery of specialized psychological tests were administered to each patient following operation. A control group of normals were matched as closely as possible with the patient group in terms of age, occupation, and socio-economic status. Test results are quantitatively treated and the resultant differences between the patient and control groups upon all of the tests employed are expressed in terms of critical ratios of the differences between the means. The author is enthusiastic in his justification of the concerted use of psychological test methods in his study. He states:

... Special measures are necessary for the tracking down of the mental changes that can be expected to appear after unilateral frontal excisions, particularly since these changes are something quite new to psychiatrists and neurologists,—something entirely apart from the usual disease pictures. ... Is there any difference between experimental psychological examination and the usual descriptive clinical procedure? It has been said that there is none. ... Every psychiatric examination is something of an experiment. But, it is a very poorly controlled experiment and difficult to organize, the conditions under which it is performed are never fixed, and the results present a tangled skein of

objective observations and subjective opinions. In the real psychological experiments, there are real hard-and-fast rules for the experimental conditions and the observations are recorded in a uniform manner. A considerably higher degree of objectivity is therefore rendered possible and the results are comparable from case to case.

Rylander employed three tests in his battery which were designed primarily to measure abstract thinking ability. Kuenburg's test which has been previously described was employed along with Rothmann's (109) sorting test. The latter is an object-sorting test very similar to that of Weigl's (134) except that there are far fewer objects to be handled upon the Rothmann test. Significant differences between the patient and control groups were found upon both these tests indicating an impairment of abstract thinking ability in the cases with unilateral ablation. Patients with left frontal excision encountered greater difficulty with the Rothmann test than those with right frontal excision. Also, a difficult version of the Terman (128) Word-Naming test was used. Patients were required to name 60 nouns within three minutes with their eyes closed. The integrity of what Goldstein has termed the "categorical attitude" would enable one to name more nouns since words could be organized in terms of specific classes or categories. The difference between the groups upon this test was also significant statistically, indicating poorer performance on the part of the frontal lobe cases. Other tests of generalization included tests of Fable Interpretation and Interpretation of Proverbs, both of which demonstrated marked differences between the patient and control groups.

Again, the presence of impairment of abstract thinking is corroborated. It is further notable that much methodological progress has been made. On the one hand, Rylander has utilized a specialized group of quantitative psychological devices. Secondly, and of great importance, is the fact that the performances of patients without frontal tissue are being evaluated against performances of normal persons with intact frontal tissue. In other words, the author has departed from the comparison of the same patient's performance upon tests given pre-operatively and post-operatively. In the latter, one is obtaining a measure of the difference between performances in two specific types of brain disorder. To seek out first the more obvious differences between normals and patients would appear more important and certainly more fundamental. Once these differences are satisfactorily depicted, one would be able to make an analysis of the differences in test performance in different forms of brain disease with far greater understanding and insight. The study of Rylander indeed represents a step in the proper direction.

The most recent investigation of abstract thinking capacity in cases of organic brain damage is that of Halstead (52) whose basic point of departure was Goldstein's notion of the "loss of the categorical attitude." His technique involved the use of an object-sorting test consisting of 62 objects of different weight, size, shape, color, brightness, hardness, and positional placement. The development of the specific technique derives from Klüver's (77) method of equivalent stimuli which involves the selection of similarities and dissimilarities from a group of presented stimuli. The group comprised twelve patients with unilateral frontal extirpation, six with unilateral temporal extirpation, two with removal of the right parietal lobe, four with unilateral occipital extirpation, and a patient with the whole of the left hemisphere of the cerebellum removed. A very well matched control group was employed and test performances of the patients were compared with the behavior of this group.

Halstead concluded that the patients with frontal lobe extirpation showed the greatest departure from the type of performance revealed by the normal group. The patients with disorder in the more posterior regions of the cortex also differed from the normals upon the test, but the difference was far less marked. The patients with temporal lobe

disease showed the second largest discrepancy from the normal group, but Halstead states that they probably had some tumor tissue irradiating to the frontal cortex. The patients with frontal lobe abnormalities employed fewer test objects in their sorting behavior than any other experimental group and also produced a smaller total number of sorted groups or categories than did the normals or the other pathological groups.

Halstead also employed the Stanford-Binet upon several of the patients, but was unable to detect any evidence of formal general intellectual deterioration as measured by this test. Nevertheless, his results clearly demonstrate the presence of an impairment of abstract thinking which was particularly striking in the patients with dysfunction in the frontal region of the brain. The author states:

We have elsewhere noted the unusually "good" postoperative social adjustments which some of them had made. Secondly, many of these cases are neurologically negative in the sense that they present no neurological "signs" of their intracranial lesion. Claims in the literature concerning the absence of psychological changes in personality following operations upon the brain must be interpreted with great caution.

Halstead further noted that upon occasion, some of the patients with frontal lobe excisions were able to shift their sorting bases among the various sorting principles permitted in the test. He states that they were clearly able to shift their sorting behavior at times and questions the basic premise of Goldstein which assumes that there is an involuntary loss of the abstract attitude which is the primary characteristic of the behavior of patients with frontal-lobe brain disease. Halstead finds that such patients can assume a "categorical attitude" upon occasion and that some more basic controlling factor than mere loss of abstraction ability is involved. However, he does not at present suggest a more basic explanatory concept, although it must be noted that the nature of the defect demonstrated by Halstead does corroborate the earlier findings of Goldstein (42), Weigl (134), Nadel (93), and Rylander (114). The study of Halstead merits further attention in that the behavior of specific pathological cases is compared with the behavior of normal adults. He states:

We insist that for an analysis of function it seems at present more important to study the existence of certain types of grouping behavior in cerebral cases in general than to make statements about the symptomatology of different lobes of the brain.

Regardless of the theoretical framework to which one is partial, it is evident that an impairment of the function of abstract thinking in patients with brain disease in the frontal cortex can be demonstrated. Whether this is a function of a "basic loss of the categorical attitude" or whether this is due to some other factor or factors need not cause too great concern at the present time. The important point is that all investigations, utilizing various types of tests, have consistently shown a difference in the behavior of the patient with frontal-lobe disease when handling such problems.

On the other hand, studies using tests of general intelligence do not reveal the presence of a defect in cases of organic brain disease when results are compared before and after surgery. As previously stated, this is tantamount to a comparison of intellectual function in different types of brain disease and does not involve a comparison of intellectual functioning between normal persons and those persons with organic brain disease. It is to be noted that in the only study in which general intellectual functioning in a large group of patients with frontal-lobe disorder was evaluated against an adequately matched normal group of control subjects, the patients were found to fall far below the level of the normal control group. Rylander (114) studied 32 cases of unilateral frontal excision with the Stanford-Binet test and found a statistically significant

difference between the patient and normal groups. The present review reveals that the difference between normals and patients with frontal-lobe involvement becomes more striking when certain component processes of general intellectual function are analyzed out and studied, namely, the ability to think abstractly. It appears that "general intelligence" still conceals certain specific component elements under its cloak which may be of potential discriminatory value in a comparison of organic and normal cases. Further investigation could profitably be directed toward a more detailed analysis of the functioning of other, specific, aspects of the intellectual process in patients suffering from organic cerebral disease.

2. Memory: Memory is another process which may be placed under the heading of "the higher intellectual functions." Actually, it may be termed a component of the intellectual process. The Stanford-Binet and other tests of general intelligence are heavily weighted with reference to test items of memory functioning. Yet, it is surprising to find the relatively limited number of investigations of a systematic nature of memory ability in cases with cortical damage. The earlier qualitative studies of the psychological alterations in brain disease have frequently indicated that memory disturbances are apparent in such cases, but generally these observations are contradictory and confused. Some investigators report no memory defect whatever, others delimit the impairment to recent memory functioning, and some place emphasis upon a deficit in remote memory. Indeed, the need for further investigation of the presence and nature of such a defect with the use of standardized psychological test techniques is a particularly striking one. Perhaps the neglect is due to the fact that memory functioning is believed to be adequately covered in tests of general intelligence. If this assumption be true, and it is a questionable one, investigators have made too little mention of the performances of patients upon the memory items of the tests. It is true that adequately standardized tests of memory are not readily available, but their construction and application would certainly appear no more arduous or difficult than those of tests of abstraction and generalization ability.

It is general text-book doctrine that organic brain disease initially affects recent memory functioning with remote memory ability usually remaining relatively intact. If the organic process be a progressive degenerative one, it is asserted that remote memory will also subsequently become impaired. It is also believed that in very extreme types of organic trauma or disease, both recent and remote memory functions will be spontaneously affected. These conclusions may be said to represent the consensus of numerous qualitative observations. However, it is obvious that gross estimates of memory ability can never be as satisfactory as standardized and quantitative studies of the relative reproduction of recent and remote memories. Only when a large number of distinct organic clinical entities are tested in this manner and compared with each other as well as with normal persons can any valid statements be made concerning memory function in such patients.

Brickner's (12) patient with bilateral frontal lobectomy underwent extensive psychological study by Tallman. Although no specific tests of memory ability were administered, certain conclusions were reached from a consideration of the patient's performance upon items of memory contained in some of the tests presented. It was stated that the patient achieved fair success upon test items dependent upon previous information and teaching, but showed a definite defect in the sphere of recent memory ability. This

was especially notable in the reproduction of digits and there was obvious difficulty with tests requiring the formation of new associations.* However, later examination revealed a notable return of recent memory functioning and the author doubts the presence of any deterioration of recent memory in a permanent or irreversible sense. Rather, the apparent defect is attributed to emotional and attentional factors which appeared improved at later test sessions.

Lidz (83) employed some crude tests of recent memory ability in his study of a case of right prefrontal lobectomy and found no impairment in this sphere when pre-operative and post-operative results were compared. The first test consisted of showing the patient a list of 25 words for two minutes following which he was asked to select those words from a large number of others which were presented. Also, prior to operation, the patient was made to learn a number of lines composed of 43 words dealing with the subject of muscle physiology. The patient was able to recite these same lines without error or hesitation 25 days after operation. On the basis of these tests, Lidz concludes that there was no defect of recent memory function as well as no post-operative impairment in the reproduction of material learned before lobectomy was performed.

Rylander (114) utilized an adequate and varied group of memory tests in his study of 32 cases of unilateral frontal excision. The tests included measurement of reception, memorization, and retention of diverse types of material. Immediate memory span was tested for both digits and syllables, a paired-associates test was employed, a story was read which later had to be reproduced, and a series of eight three-letter nonsense syllables were exposed with a memory drum until repeated without error by the subjects. Three hours later, the test was repeated and the "savings score" was calculated. The results of the patients' performance upon these tests were then compared with those of a group of matched normal controls. The digit and syllable-span tests along with the story test revealed no significant differences between the patients and normals. The nonsense-syllable memory test demonstrated a statistically significant difference with respect to the number of trials required for the original learning of the list. The patients consistently required many more trials than the normals to master the list. However, although the "savings scores" pointed in the same direction, the difference between the normals and patients was not statistically significant. Upon the paired-associates test, there was no difference between the two groups upon the first trial. However, later trials strongly indicated that the formed associations weakened faster with the passing of time in the case of the patients. This difference was significant when the results of the patients with complete unilateral lobectomy were compared with their matched controls. It is to be noted that the tests employed are directed toward various aspects of recent memory function.

The conclusions to be drawn suggest that the patients show no impairment of immediate associative memory as tested by digit and syllable span and no impairment of retention of recently learned material as revealed by the story and nonsense-syllable tests. However, there is evidence of difficulty in the formation of new associations with rote material as well as evidence of a more rapid dissipation of retention of recently learned associations on the part of the patients with brain ablations. Unfortunately, no specific tests of remote memory function were administered and therefore no comparison of recent and remote-memory ability is permitted in this study. However, Rylander's study of recent memory in these cases is very adequate and it is apparent that his conclusions are not entirely consistent with the qualitative notions of memory functioning derived from cases of frontal excision.

* Tallman questions the representativeness and the optimity of the tests since the interference of emotional and attentional difficulties was generally very marked during test sessions and frequently the patient was flatly uncooperative and disinterested.

Conkey (16) presents interesting memory results in a group of patients who suffered traumatic head injuries. The basic aim of the study was to obtain information concerning the recovery of certain psychological functions over a period of time following the trauma. Conkey makes the following statements to justify her use of quantitative tests in such a longitudinal investigation:

It is recognized by medical men and those who are in contact with patients suffering from such injuries that at least in a large number of the cases the patients continue to complain of "poor memory," "the inability to keep their attention focused," "undue fatigue after any mental exertion," and other "mental" symptoms, long after the apparent physiological causes have ceased to function, or at any rate, after they no longer manifest themselves in discernible physical signs. We realize that physical and neurological examination still is, and will remain, the basic criterion for diagnosis and therapy in these patients; that tests and quotients cannot replace the opinion and judgment of an experienced clinician; but as Savitsky (117) says, "the day has passed when the neuropsychiatrist can ask the injured person a few questions and as the result of a brief interview form an opinion as to the intactness of all the psychological processes, the patient's adaptive capacity, and his personality make-up." We wish, therefore, to show a recovery curve in at least some of these psychological functions.

Conkey emphasizes the fact that a patient cannot be said to be recovered until psychological recovery has attained its maximum. Her results clearly demonstrate that recovery of memory ability lags far behind the recovery of other psychological functions and that it is very necessary to distinguish adequately between memory for new and old material in this respect. By a series of retestings over a long period of time, it was possible to obtain an approximate recovery point which could then be evaluated against the probable performance level prior to the brain trauma. She also utilized two control groups. The first consisted of hospitalized patients suffering from ailments other than neurological or psychiatric types in order that the effect of mere hospitalization upon test performance could be studied. The second control group consisted of 30 normal persons matched with the patient group for age, education, economic and social status. The results indicate that recovery can be demonstrated for all psychological functions tested and that maximum recovery appears to occur thirty-four weeks after injury for simple mental activities such as orientation, immediate perception and reception. Recovery of a maximum nature also appears upon tests requiring new learning and perception of an abstract kind about thirty-four weeks after the injury was sustained.

However, the situation was found to be quite different for tests of both recent and remote memory ability.* With reference to both aspects of memory functioning, the deficit appears to be more permanent since at the end of fifty weeks, the scores of the patients remained significantly below the scores of the normal control groups. Conkey concludes further that the permanence of a generalized memory defect becomes even more striking in the records of individual patients where there had been loss of consciousness and amnesia at the time of the injury. It is to be noted that the residual memory defect found by Conkey is much more marked and generalized than that noted by Rylander (114) and Lidz (83). It seems somewhat similar to the defect remaining in Brickner's (12) patient who underwent bilateral frontal excision. The explanation for the extreme findings of Conkey may well lie in the fact that much pathological scar tissue continued to be present in several of her patients during all of the test sessions. This might conceivably interfere with any functional transfer within the cortex. Such a transfer is not precluded theoretically in Rylander's cases of unilateral excision of frontal tissue.

In his analysis of frontal-lobe function by the sorting-test method, Halstead (52) also included in his test procedure a measure of immediate recall of test objects following a

* For a complete description of the memory tests employed, see Appendix I in Conkey's monograph.

five-minute recess. The subjects were asked to recall spontaneously as many of the objects of the sorting test to which they had previously been exposed as they could. The findings and interpretation of the results are well stated by Halstead:

When tested for recall after an interval of five minutes, our frontal lobe cases recalled on the average considerably fewer objects from the test-field than did the other types of subjects. While this tendency towards a reduction in recall is marked in the results of the present investigation, it should be noted that the test for recall made was in terms of material of a particular kind, a single interval of delay (five minutes) and a single indicator of recall (verbal). Thus only further investigation can reveal to what extent the tendency noted here is a general one for memory functions of individuals with a frontal lobe lesion.

It appears that Halstead has struck a particularly important note in his reference to the use of only a verbal indicator of recent recall. Verbal tests of memory as well as such tests of any component element of the intellectual process are very susceptible to perversion as a result of possible expressive speech disturbances. Motor aphasic disturbances are especially common in frontal-lobe disorders and the majority of the patients studied psychologically have been of this type. More specifically, believers in strict localization of function have attributed disturbances in expressive speech to a lesion in the posterior portion of the third frontal convolution. The problem arises particularly when tests of memory of a verbal nature are employed since it might be difficult to determine to what extent a low performance is due to actual loss of memory function or to what extent the apparent defect is due to an expressive amnesic or nominal aphasia. The problem as to whether or not aphasic disturbances are indications of a more general loss of intellectual functioning is beyond the scope of this paper. The more general opinion upon this issue appears to be that aphasia may exist quite apart from any inherent intellectual deterioration. The methodological psychological problem in this respect revolves about further work in the development of more adequate non-verbal or performance tests. This is a general demand in the field of organic brain disease and is a special need in the field of memory ability.

Until more satisfactory techniques for the measurement of the various aspects of memory function are developed and until these are applied to a large number of various clinical pathological entities, little of a conclusive nature can be said of memory functioning in organic brain disease. At present, there are far too few studies which have employed satisfactory techniques and a sufficiently large sample of cases. The results have demonstrated nothing that may be considered even a consistent trend, findings being inconsistent and contradictory. Memory functioning in the organic patient is indeed a fertile field for further psychological investigation.

3. *Disturbances in Attention:* Qualitative observations of patients with brain damage in the frontal cortex have consistently emphasized the presence of a striking defect in the attentional sphere. This has usually been described as a state of heightened distractibility. The threshold of awareness and responsiveness to external extraneous stimuli becomes lowered so that one sees a sporadic type of distractibility. Ackerly (1) in his report of a case of bilateral frontal ablation departs from the opinions of other observers of this function in reporting an abnormally high threshold of resistance to the usual distracting external stimuli. However, as it has been previously pointed out, all other descriptive studies of attention in organic brain disease refer to increased distractibility as a predominant symptom (25) (9) (106) (136) (32) (122).

Disturbances in attention are also commonly seen in such "functional" mental disorders as manic-depressive psychosis and schizophrenia. However,

qualitative observations of a comparative nature yield differences in the kind of attention defect manifested by patients with organic brain disease. Schizophrenic patients tend on the whole to show a steady and non-fluctuating type of attention defect which is more or less continuously present. This appears to be a function of withdrawal from the reality situation with consistent inner preoccupation. As a result, the schizophrenic patient cannot be made to attend to external stimuli for any significantly long period of time. Continuous pressure has to be applied if one is to attain and maintain his attention. The conflict between the internal and external situations accounts for the observable attention defect—one of preoccupation. The type of attention defect seen in manic patients best fits into the category of "distractibility." The manic, unlike the schizophrenic, is constantly at the beck and call of the external reality situation. The disturbance is consistently present and manifests itself in a fleeting concern with the successive external stimuli which are perceived. In contradistinction to the manic and schizophrenic types of attention defect, the patient with organic brain disease shows a sporadic kind of disturbance whose appearance is usually temporarily unpredictable. It is not of the consistent and steady kind described above; rather, "now you see it and now you don't." The basis for such a defect is more difficult to assign. It may be related merely to the easy fatiguability of organic patients or it may be correlated in some manner with the occasional lability of mood and irritability frequently observed in them. However, one need not be too greatly concerned with the possible etiology. The fundamental practical consideration involves awareness of the inconsistency of the distractibility in the organic patient. This factor should be noted from the point of view of its possible value in differential diagnosis.

Despite the marked emphasis upon defects in attention in organic and other psychotic states, psychological test specialization has been relatively little concerned with this problem up to the present time.

Among the psychological studies of organic brain disease, only those of Freeman and Watts (33) in cases of bilateral frontal lobotomy* and Rylander (114) in cases of partial unilateral frontal lobectomy have been interested in accurately measuring distractibility of attention. In the first study, Hunt examined 48 patients before and after bilateral frontal lobotomy and employed a cancellation-test technique to measure the presence and degree of distractibility of attention following the surgical production of frontal lesions. Tests were scored separately for speed and accuracy. The speed scores revealed that performances are slower following frontal lobotomy and this difference was reliable. However, after operation the patients made far fewer errors upon the test; 60 percent of the cases demonstrated higher post-operative accuracy scores. This difference was also statistically significant.

A more elaborate psychological study of attention was undertaken by Rylander (114) in his cases of partial unilateral frontal excision for the removal of pathological tissue. He utilized a group of three test procedures. The first consisted of a tachistoscopic presentation of a nonsense syllable of three letters for a period of time of one second. The exposure time was then gradually decreased until three successive failures appeared. Actually, speed of visual perception was being measured by this test. The second involved the reading of a text of 114 words while crossing out all the E's and N's of which there were 200. The number of cancelled letters was assumed to indicate the degree of

* The psychological examinations were performed by Thelma Hunt in this study and the results were reported by her in a paper delivered at the meetings of the Eastern Psychological Association at Atlantic City, N. J. in April, 1940.

attention. The third test employed required the patient to count backwards from 100 to 0 subtracting 3 each time. The author states that stress was placed upon concentration of attention and endurance rather than upon arithmetical ability. In comparing the performances of the patients upon these tests with the normal control group, one finds that the tachistoscopic and subtraction techniques did not reveal significant differences between the two groups. The only difference which was statistically significant, corroborates the finding of Freeman and Watts (33) that after operation the patients required a longer time to complete the cancellation test. Accuracy scores gave no reliable difference between the patients and normals.

At the present time, a final evaluation of the attention defect in patients with organic brain disorders is hardly possible. Both Rylander and Hunt find that patients require significantly longer times upon tests designed to measure this function. However, little more can be said on the basis of the present studies. It would appear that the increase in time scores might well be suggestive of a real deficit in the sphere of attention and that the need is one demanding finer methods of measurement. On the other hand, the accuracy scores might be of greater importance in denoting the absence of any attentional defect in such cases. In such an instance, the poorer speed scores could conceivably have been due to change in psychomotor tempo which is a symptom frequently reported in the qualitative studies of organic brain disease. In the investigations reported by Rylander (114) and Freeman and Watts (33), the dominant trend may have been in the direction of retardation rather than in acceleration.

4. *Changes in Personality:* Alteration in the general personality pattern has long been one of the most frequent qualitative findings in cases of organic involvement of the more anterior regions of the cortex. Symptoms reported in cases of frontal and temporal tumors and lesions are strikingly similar to the type of picture one finds in the general paretic patient. Infantile and puerile behavior, boastfulness, occasional delusions of a grandiose nature, immorality and asocial behavior are but a few of the changes which have been described. Although such changes are rarely noted in cases of unilateral frontal ablation, the case of bilateral frontal lobectomy reported by Brickner (12) is an excellent example of the type of personality alteration described.

Psychological studies of such manifestations have been confined wholly to alterations in the structural aspect of the personality character and have been almost entirely limited to the use of the Rorschach Inkblot Method. Other available tests of personality deal with the content rather than the structure of personality and are much more qualitative in nature.

Rorschach (108) makes little reference to the performances of patients with organic disease in the original monograph. His group of cases contained only 5 who were suffering from brain disorders and some of these appear to have been of questionable diagnosis. His observations on the performances of the patients are very limited and unorganized. Oberholzer (97) has long been interested in the Rorschach performances of patients with organic brain involvement and has studied epileptics and cases of traumatic cerebral injury.

The first concerted study of the personality changes in organic brain disorders was made by Piotrowski (105) in 1937. He obtained Rorschach records in 18 cases of organic cerebral involvement which were compared with the records in 10 cases with non-cerebral involvement of the nervous system and 5 cases of conversion hysteria. As a result of this study, Piotrowski singled out ten signs which he believed were indicative of cerebral organic damage and further stated that if six or more of these signs were present, there

was strong justification for a diagnosis of organic involvement of the cortex. However, it would seem that the generalizations of Piotrowski on the basis of this study should be accepted for the present with some reserve. As Harrower-Erickson (55) has pointed out, little is known of the nature or location of the brain damage in his cases; further, one does not know whether the patients were examined before or after operation. However, the value of Piotrowski's investigation in respect to its suggesting the application of the Rorschach test in a systematic manner to patients with cerebral damage cannot be minimized.

Nadel (93) attempted to apply the organic signs of Piotrowski in a Rorschach investigation of patients with frontal lobe disease. The experimental group consisted of 15 patients who had been diagnosed as suffering from lesions in either the left or both frontal lobes. The records of these patients were compared with those of 15 patients suffering from involvement of areas of the cortex other than the frontal region. The results demonstrate the presence of an average number of 5.1 of Piotrowski's signs in the group with frontal lesions as compared with an average number of but 1.6 signs in the control group records. Nadel further finds that 6 of these signs are of particular diagnostic significance. It appears that the signs postulated by Piotrowski are of greatest diagnostic significance where the organic involvement lies in the frontal cortex. The paradox inherent in an evaluation of the results of Piotrowski and Nadel lies in the fact that the former postulated the ten signs on the basis of a study of cases in which the damage involved all areas of the cortex while the latter found such signs predominantly confined to the frontal region. One would therefore deduce that Piotrowski's experimental group contained a large number of frontal-lobe cases.

The recent studies of Harrower-Erickson (55, 56) utilizing the Rorschach test in patients with cortical involvement are especially well organized and described. The records of the patients are compared with the "average normal" type of record, the patient group being divided in terms of the nature of the disease process, the location of the damage, and pre-operative and post-operative conditions. The experimental group consisted of 25 patients whose records were compared with the average normal record. The gross results indicated "restricted and constricted personality, extraordinarily uniform when contrasted with the variety found in the records of the normal subjects." When patients were compared with reference to the nature of the brain damage, no notable differences could be established. The rate of growth of the tumor could not be estimated on the basis of the Rorschach performance. Also, in contradistinction to the findings of Nadel (93), the location of the damage in the cortex did not appear to be a differential factor. However, the author states that further investigation is necessary upon this problem and is in progress. When pre-operative and post-operative records are compared, it is found that the latter more closely approximate the normal type of performance. This conclusion is consistent with the more general finding demonstrating more positive signs in the presence of pathological tissue than in the absence of brain tissue. The most significant positive findings advanced by Harrower-Erickson is that the Rorschach test was clearly able to differentiate between the organic performance and the performance of patients without organic involvement whose symptoms are clinically similarly to those of the organic group.

Harrower-Erickson (56) also studied a group of 24 patients with focal epilepsy in order to discover the possible presence of a personality pattern specifically characteristic of such a disease entity. Earlier Rorschach studies had given rise to inconclusive and contradictory results. Guirldham (49) had studied 100 cases with varying types of epileptic conditions and concluded that there was no Rorschach pattern that could be regarded as typical of such a group of cases. Stauder (123), on the other hand, had found that Rorschach records of epileptics were unmistakably similar and that there were definite signs specific to such cases. It must be noted, however, that Stauder employed a

group of deteriorated epileptic subjects. Harrower-Erickson (56) had found that the Rorschach records of deteriorated epileptics and those of patients with focal epilepsy are quite different.

Harrower-Erickson's study involved 24 subjects, all of whom had undergone surgery for the removal of scar tissue. The author was able to compare pre- and post-operative records in 10 of these cases. The results obtained were compared with those of a group of patients with larger infiltrating lesions, a group upon whom craniotomy had been performed, and a group of deteriorated epileptics. The most striking feature of the findings in this investigation is the marked variability of the performances of the patients with focal epilepsy. There was no characteristic or specific personality picture and in general the results corroborate those obtained by Guirdham (49). Other positive findings are concerned with the problem of prognosis following operative procedure. There appeared to be certain indications in the pre-operative records of the patients which were somewhat correlated with tendencies toward post-operative improvement, but as Harrower-Erickson states, further investigation is indicated:

This makes one hope that such studies may make a contribution to prognosis, for if improved psychological capacity, as evidenced by the Rorschach test, is in itself an index of improved cerebral function, as is suggested by this study, this method may become a prognostic procedure for the selection of those patients who are most likely to be benefited, both mentally and physically, by operative intervention.

At the present time, investigations upon patients with brain involvement with the Rorschach test indicate that there are numerous problems still in need of further exploration. The limited number of systematic studies does seem to demonstrate clearly the potential value of this test with reference to the alterations in personality. The Rorschach test is a technique which subtly evaluates the structure of the personality. In the more extreme cases of organic brain disease, personality modifications are clinically obvious and do not require fine and accurate measurement. However, the possibilities which the Rorschach method offers with respect to the detection of personality deviation where clinical behavioral manifestations are not immediately apparent must be further explored.

5. *Changes in Psychomotor Tempo*: Because of the relatively high frequency with which qualitative studies of frontal and temporal brain disease observe alterations in the speed of thinking as well as motor behavior, one would expect numerous psychological investigations directed toward such psychomotor functions. Although, in addition, various techniques are available, there is a surprising dearth of such studies in cases of organic brain pathology. This may be due to the preoccupation with changes in the intellectual and affective spheres which have received most of the attention of investigators in the field.

Hunt, in her psychological examinations which were part of the study of the effects of pre-frontal lobotomy by Freeman and Watts (33), employed a group of tests which were almost exclusively measures of psychomotor tempo. Most of her tests were scored on the basis of speed of performance. Her results demonstrated that eight of the tests yielded reliable differences between pre-operative and post-operative performances. Of these eight tests, six were exclusively measures of the speed of performance. More specifically, she found that speed of arithmetical calculation, speed of cube construction, and speed of color naming were significantly faster after pre-frontal lobotomy operation. On the other hand, the rates of performance upon a paper formboard test, a cancellation test, and a substitution test were significantly slower after pre-frontal lobotomy. The results are therefore inconclusive with reference to the general problem of changes in psychomotor tempo after removal of frontal brain tissue. An analysis of the functions measured seems to suggest that performance is slower after operation when sustained attention and

recent memory functions are involved. There appears also to be greater impairment of speed when the formation of new associations are required.

Studies of performance test ability by Rylander (114) and Conkey (16) have been concerned with the accuracy and quality of the performance rather than with the speed. Despite the qualitative detection of easy fatigability in such cases, no significant studies on pure motor functions have been carried out. Studies of brain tumors and other lesions have yielded results with respect to psychomotor tempo in both possible directions. Some patients demonstrate an acceleration in motor behavior while others appear retarded. These changes appear to be related to the associated changes in mood since depression generally accompanies retardation while euphoria tends to be found in cases showing hyperactivity. Perhaps the direction of change which the mood and activity level of the patient will assume is related to some factor or factors in the personality make-up or development of the individual. If such were the case, the paradoxical results reported by Hunt with reference to psychomotor tempo might well be representative of the general findings which one may anticipate in organic cases. That is, some individuals will show hyperactivity with euphoria and restlessness while others will become retarded with depression of mood. A study of this more general aspect of this problem seems to be indicated and might well be approached in terms of motor and psychomotor investigations upon patients with organic brain disease.

6. *Disturbances in Perception:* Bender (4) has developed a test which measures the ability to perceive and reproduce a series of gestalt forms. This test has been administered to various groups of clinical disease entities including patients suffering from some form of organic brain involvement. Empirical results indicate that the patients with brain disorders encounter marked difficulty in the motor reproduction of these gestalt forms. Also, the errors made by such patients appear to be of a rather definite and constant type and differ from the errors made by the "functional" disease groups as well as from the performances of children. The defect is therefore believed by Bender to be in the nature of a pathological performance rather than any regression to a more infantile or ontogenetically lower level.

Bender feels that the errors made by the patients with organic brain involvement upon this test are due to some inherent inability to perceive the gestalt forms adequately. There is said to be some defect that may be explained in terms of the various laws of gestalt perception. Since the patient does not adequately perceive the forms, it would follow logically that there would be difficulty in reproducing them. However, there is a question as to whether the errors upon this test are actually due to an inherent perceptual defect or whether they are simply a function of some motor or apractic defect related to pathological involvement of the motor cortex. Also, fine tremors of various types are very common in organic cerebral disorders and may possibly account for much of the difficulty with this test. However, these reservations do not detract from the value of the test as a clinical device. Empirically, it does seem to differentiate the organic type of case from other clinical groups.

Harrower-Erickson (54) found a definite perceptual defect in patients with cerebral lesions. She employed the Rubin (112) profile-vase drawings. The experimental group consisted of 30 patients with unilateral lesions of the frontal, frontal parietal, and temporal regions. The performances of these patients were compared with those of a group of 30 normal control subjects. The test procedure involved the presentation of a total of seven drawings to each subject. Three of these were enhanced profiles, three were vases, and one was ambiguous. The subjects were merely required to state what they saw. A "normal response" was said to be a direct perception of the ambiguous figure as either a vase or a profile. The results demonstrated a striking difference between the patient and control groups. Of the normals, 90 percent gave "normal responses" as opposed to but 6.6 percent of such responses in the group with organic brain lesions. The patients

consistently failed to recognize the ambiguous figure as a familiar object even after correct perception of all the other figures. They frequently brought in new objects which they substituted for the vase or the profile. They showed marked rigidity and perseveration of perception in clinging to the figure which was first seen and also showed a strong tendency to be concerned with concrete details. Instead of stating the profile to be such, the patients tended to give it some definite name such as Roosevelt or Washington. None of these phenomena occurred to any notable extent within the normal group. From these results, Harrower-Erickson concluded that patients with brain lesions show a definite defect in the perceptual sphere. This is quite in keeping with the conclusions of Bender (5). The author points out the following implications of her findings:

The value of such findings would seem to lie in the fact that they may give us clues to certain qualitative differences in the experiences and behavior of persons suffering from cerebral lesions, differences which might well leave unaltered a quantitative estimate of the intelligence level, and might pass unnoticed in ordinary daily life and yet if recognized may enable us to reconstruct more accurately the changed psychological world resulting from changes in the brain.

More recently, Werner and Strauss (135) found that the perception of figure-background relationships of mentally retarded children with brain lesions was pathological and differed from that of children of normal intellectual development. In order to show that the perceptual defect was not a function of the low intellectual level, the performances of the mentally retarded children with brain lesions were compared with the performances of a group of matched mentally retarded children without organic brain disease and the latter group did not show pathological figure-background perception. The normal group contained 30 children while the two mentally retarded groups consisted of 25 children each. Four tests were employed, of which two were tachistoscopically presented and involved visual perception, one was a test of visuo-motor ability and involved the reproduction of a design on a marble board, and the other was a test of tactual-kinaesthetic perception.

The results demonstrated that the children with brain lesions consistently experienced difficulty in extracting the figure from the background. They tended to respond entirely to the background or were predominantly attracted by the background. This difference between the group with brain lesions and the retarded children without organic brain disease was consistent upon all tests involving visuo-motor and tactual-motor as well as visual perception. It should also be noted that this difference cannot be ascribed to the presence of gross motor defects in the children with brain lesions since children in whom such disturbances were discovered were excluded as well as those showing visual agnosia. It appears therefore that the children with organic brain lesions demonstrated an inherent perceptual defect which must be attributed to the presence of organic cerebral damage. However, the authors make mention of the possible relationship of the perceptual defect to heightened distractibility of attention resulting in preoccupation with aspects of the background as opposed to consistent selective concern and attention to the figure. The striking consistency with which Bender (5), Harrower-Erickson (54), and Werner and Strauss (135) have found disturbances in perceptual organization in cases of organic brain disease indeed indicates the uncovering of a valuable clinical tool with reference to the problem of differential diagnosis.

IV. SUMMARY AND CONCLUSIONS

There are three fundamental questions which arise in relation to the clinical value of systematic investigations of the psychological alterations in organic disease of the cerebral cortex. These might be stated as follows:

1. Is there a group of psychological changes which occurs with sufficient frequency and consistency to be considered as an "organic psychological syndrome"?

2. Can such mental symptoms be of any potential value in contributing toward the localization of the pathological process in the cortex?

3. Can an investigation of the mental changes contribute toward a knowledge of the nature of the pathological process?

A review of the descriptive or qualitative studies of the mental changes in organic brain disease enables one to hazard a reply to each of these questions.

With respect to the first question, it may be stated that there is a group of general and diverse mental symptoms which occurs with sufficient frequency and consistency to be considered at least tentatively as constituting a "frontal-lobe mental syndrome." Intellectual deterioration, memory defects, impaired abstract-thinking ability, loss of initiative, difficulties in sustaining attention, alterations in the general personality structure, and changes in psychomotor tempo and mood tone are particularly characteristic of tumors and other lesions of the frontal region of the cortex. These changes are less severe and less consistent in instances of ablation of frontal lobe tissue. These same psychological symptoms apparently occur frequently in temporal lobe involvement, especially in tumors and some types of progressive lesions in that area. However, it may be noted that mental symptoms in temporal lobe disease are apparently not as marked or consistent as in frontal lobe disease and also that the mental picture presumably develops later in the disease process than in the case of focal frontal-lobe involvement.

It is possible, therefore, that the mental changes cited above are related to frontal-lobe disease and that their appearance in certain types of focal temporal region disease is a result of secondary involvement of the frontal cortex by virtue of either increased intra-cranial pressure of a generalized nature or some type of progressive degenerative lesion implicating the frontal region. Goldstein (45) has stated that damage in any area of the cerebral cortex will eventually irradiate to the frontal region. However, qualitative studies of parietal and occipital disorders yield no mental changes similar to those observed in cases of fronto-temporal involvement. It appears, therefore, that the mental symptoms are of some value in the localization of the disease process within the cortex, being indicative of either primary or secondary involvement of the frontal cortex. This would seem to imply a positive answer to the second question posited above: the time of onset of the mental changes in the disease process has important implications for temporal-region localization in that a relatively late appearance of the mental syndrome would be suggestive of focal temporal-lobe disease. These conclusions are, of course, derived entirely empirically.

The third question asked is the most difficult and any positive statements must be considered as highly tentative. However, it is felt that some indication of the nature of the disease process may emerge from a study of the severity, as well as the number, of the mental symptoms which are present. Frontal lobe tumors and other focal lesions along with temporal tumors appear to give rise to the most severe and consistent mental symptoms and temporal lesions of a progressively degenerative type are next in importance. In the case of the latter, the psychological changes appear later in the disease process. Finally, it is found that the symptoms are consistently less severe and least frequent in cases of partial bilateral or unilateral frontal or temporal ablation.

The hypotheses of inter-lobular and intra-lobular transfer of functional ability have been suggested by various authors as possible bases for the absence of marked mental changes where cortical tissue has been excised. It is conceivable, as Brickner (14) has pointed out, that psychological function is

bilaterally represented within the pre-frontal cortex. It is further possible that representation of functional ability is of a generalized nature within the entire association area of any one frontal lobe. The process of transfer of psychological function within the pre-frontal cortex requires the integrity of the commissural fibres through the corpus callosum as well as the association fibres and may be thought of in terms of a gestalt-like mechanism of interacting nerve fibres. This process of nerve fibre interactivity is presumably disturbed and cannot be carried out adequately in the presence of pathological tissue in the frontal region, as evidenced in the severity and frequency of the mental symptoms in frontal tumors and other lesions of that area. It appears that only in the absence or excision of pre-frontal tissue is it possible for such a transfer of function to take place with the resultant mild psychological changes which have been observed. Psychological studies, however, have demonstrated that such a transfer of functional ability is hardly of a complete nature, although it seems sufficient to escape general qualitative and clinical symptomatic detection. Specialized test methodologies suggest the presence of certain apparently irreversible mental deficits following excision of pre-frontal tissue which may well be missed unless a specific controlled situation is brought before the patient. Such a definitely controlled situation is that of psychological test procedure. Also, such test methods have served to break down certain of the broad and more general mental changes qualitatively observed into more specific and definite functional defects.

The approach to the problem of the mental changes in organic brain disease through the media of psychological test techniques has been described as being of two basic kinds. Both types of studies are primarily concerned with the relationship between the frontal cortex and mental function. One approach has employed conventional or *unspecialized* tests of formal intelligence and general results indicate negative findings with reference to the presence of "general intellectual deterioration." Pre-operative and post-operative test comparisons upon patients undergoing excision of frontal tissue yield no gross lowering in the intelligence test scores following brain surgery. In fact, in some instances, a definite gain in the intellectual level has appeared following frontal ablation.

However, with the development and application of *specialized* psychological test procedures to this general problem, certain subtle but definite mental defects emerge. Such test development has consisted largely in an analysis of certain of the component elements of the so-called "general intellectual process" such as abstract thinking, memory ability, or judgment and comprehension. Other symptomatic and specialized tests have also yielded positive findings. Among these are the Rorschach, the Bender test of visuo-motor gestalt function, and tests of sustained attention. Such studies have been primarily applied in cases of partial unilateral frontal excision in which the qualitative studies have noted either mild mental changes or complete absence of any mental defects after surgery.

The conclusion seems warranted that specialized test procedures can and do reveal definite impairment in mental functioning in cases in which pre-frontal lobe tissue has been removed surgically, whereas clinical observation of a qualitative kind finds no psychological deficits in such cases. The presence of certain subtle irreversible mental defects points to the fact that the existence of any mechanism for the lobular transfer of psychological function within the frontal cortex cannot be visualized as a complete "regenerative" process. Certain mental functions suffer irreparable damage when frontal

tissue is removed, but such defects can be studied or detected only by means of a highly specialized and controlled type of situation. The principle contribution of psychological test procedures in this problem must lie in the subsequent development of specialized situations which would call forth and reveal impairment in mental functioning which escapes qualitative clinical detection.

At present, superficial study of the investigations utilizing test procedures reveals a somewhat confused picture. One must not minimize, however, the emergence of some consistent positive trends. The difficulties in obtaining adequate quantitative sampling at the human level in such cases along with the problems inherent in clinical diagnosis and localization must be recognized. However, despite the use of a great variety of tests upon all manner of organic clinical entities in an unsystematic manner, it has been shown that certain definite conclusions are possible from an organized survey of the field. The mental changes in organic brain disease appear clearly to embrace more than any single psychological functional sphere. Experimental investigation must proceed from numerous and different directions if the parts of the puzzle are to be joined together.

It is felt that experimental progress demands the satisfaction of two basic methodological considerations. First, it would seem that the primary and fundamental situation must involve comparisons between the test performances of patients with organic brain disorders and normal persons. Logically, one would expect to see the more obvious differences emerge in such a comparison. Then, one could proceed to a study of patients with respect to the problems of different types of brain disease and differential localization of brain damage with chances of attaining greater understanding and accuracy. Second, it is felt that specialized test development should be directed toward the various spheres of possible psychological impairment. The diverse nature of the mental defects qualitatively seen in organic cases must be totally explored with the use of specialized test techniques. The problem of mental alteration in organic disease of the brain cannot attain certainty and generalization in terms of a single test procedure. A battery of test techniques which will attack psychological functioning in the organic patient at every potential vulnerable point appears to be most advantageous. It is felt that one of the principle justifications for a review of this kind lies in its demonstration of the type and multiplicity of such vulnerable points of attack.

BIBLIOGRAPHY*

1. ACKERLY, S. Instinctive, emotional, and mental changes following pre-frontal lobe extirpation. *Amer. J. Psychiat.*, 1935, 92, 717-729.
2. BALADO, M., ADROGUE, E., & FRANKE, E. Alteraciones de la función visual en los casos de lesión del lóbulo occipital izquierdo. *Arch. argent. de neurol.*, 1936, 15, 19-53. (*Zbl. ges. Neurol. Psychiat.*, 1937, 84, 463-464.)
3. BARUK, H. *Les troubles mentaux dans les tumeurs cerebrales. Etude clinique, pathogenie, traitement.* Paris: O. Doin, 1926.
4. BENDER, L. Disturbances in visuomotor gestalt function in organic brain disease associated with sensory aphasia. *Arch. Neurol. Psychiat.*, Chicago, 1933, 30, 514-537.
5. BENDER, L. Gestalt function in visual motor patterns in organic disease of brain, including dementia paralytica, alcoholic psychoses, traumatic psychoses, and acute confusional states. *Arch. Neurol. Psychiat.*, Chicago, 1935, 33, 300-329.

* Titles in the bibliography for which references are also given in parentheses were seen only in abstract form.

6. BIANCHI, L. The functions of the frontal lobes. *Brain*, 1894, 18, 497-522.
7. BIANCHI, L. *The mechanism of the brain and the function of the frontal lobes*. New York: William Wood, 1922. (Translated by J. H. MacDonald.)
8. BOLLES, M. M. The basis of pertinence. *Arch. Psychol.*, N. Y., 1937, 30, No. 212, Pp. 51.
9. BOLTON, J. S. The functions of the frontal lobes. *Brain*, 1903, 26, 215-241.
10. BRAIN, R. Discussion on the mental symptoms associated with cerebral tumors. *Proc. roy. Soc.*, 1931, 24, 1002.
11. BRICKNER, R. M. An interpretation of frontal lobe function based upon the study of a case of partial bilateral frontal lobectomy. *Res. Publ. Ass. nerv. ment. Dis.*, 1934, 13, 259-351.
12. BRICKNER, R. M. *The intellectual functions of the frontal lobes*. New York: Macmillan Co., 1936.
13. BRICKNER, R. M. Bilateral frontal lobectomy: Follow-up report of a case. *Arch. Neurol. Psychiat.*, Chicago, 1939, 41, 580-585.
14. BRICKNER, R. M. Conscious inability to synthesize thought in a case of right frontal tumor and lobectomy. *Arch. Neurol. Psychiat.*, Chicago, 1939, 41, 1166-1179.
15. CLAUDE, H. Les fonctions du lobe frontal. *Rev. neurol.*, 1935, 54, 518-524.
16. CONKEY, R. C. Psychological changes associated with head injuries. *Arch. Psychol.*, 1938, 33, No. 232, Pp. 64.
17. CONRAD, K. Versuch einer psychologischen Analyse des Parietalsyndroms. *M Schr. Psychiat. Neurol.*, 1932, 84, 28-97. (*Zbl. ges. Neurol. Psychiat.*, 1933, 66.)
18. DANDY, W. E. Removal of the right cerebral hemisphere for certain tumors with hemiplegia. *J. Amer. med. Ass.*, 1928, 90, 823-825.
19. DANDY, W. E. The effects of total removal of the left temporal lobe in a right handed individual: Localization of the areas of the brain concerned with speech. *J. Nerv. ment. Dis.*, 1931, 74, 739-742.
20. DERCUM, F. X. A report of three pre-frontal tumors. *J. nerv. ment. Dis.*, 1910, 37, 465-480.
21. DONATH, J. Die Bedeutung des Stirnhirnes für die höheren seelischen Leistungen. *Dtsch. Z. Nervenheilk.*, 1923, 76, 281-306.
22. DONATH, J. The significance of the frontal brain with respect to the higher psychic functions. *J. nerv. ment. Dis.*, 1925, 61, 113-141.
23. DUSS, P. Über psychische Störungen bei Tumoren des Orbitalhirns. *Arch. Psychiat. Nervenkr.*, 1939, 109, 596-648.
24. ENGERTH, G. Über isolierte Störungen in der Verwendung der blauen Farbe bei parietalen Herderkrankungen. *Z. ges. Neurol. Psychiat.*, 1934, 149, 723-736. (*Zbl. ges. Neurol. Psychiat.*, 1934, 73, 44.)
25. FERRIER, D. The functions of the brain. London: G. P. Putnam's Sons, 1886.
26. FEUCHTWANGER, E. *Die Funktion des Stirnhirns, ihre Pathologie und Psychologie*. Berlin: J. S. Springer, 1923.
27. FOERSTER, E. Die psychischen Störungen der Hirnverletzten. *M Schr. Psychiat. Neurol.*, 1919, 46, 61.
28. FOX, J. C. & GERMAN, W. J. Observations following left (dominant) temporal lobectomy. *Arch. Neurol. Psychiat.*, Chicago, 1935, 33, 791-806.
29. FRANZ, S. I. *On the functions of the cerebrum: The frontal lobes*. New York: Science Press, 1907.
30. FRANZ, S. I. The functions of the cerebrum. *Psychol. Bull.*, 1914, 11, 131-140.
31. FRAZIER, C. H. & ROWE, S. N. Localization of fifty-one verified tumors of the temporal lobe. *Ass. Res. nerv. ment. Dis.*, 1932, 13, 251.

32. FRAZIER, C. H. Tumor involving the frontal lobe alone. A symptomatic survey of 105 verified cases. *Arch. Neurol. Psychiat., Chicago*, 1936, **35**, 525-571.
33. FREEMAN, W. & WATTS, J. W. An interpretation of the functions of the frontal lobe based upon observations in 48 cases of prefrontal lobotomy. *Yale J. Biol. Med.*, 1939, **11**, 527-539.
34. FREEMAN, W. & WATTS, J. W. The frontal lobes and consciousness of the self. *Psychosom. Med.*, 1941, **3**, 111-119.
35. FRITSCH, G. & HITZIG, E. Über die elektrische Erregbarkeit des Grosshirns. *Arch. Anat. Physiol. wissen. Med.*, 1870, 300. (Ref.: Raney, S. W. *The anatomy of the nervous system*. London: W. B. Saunders, 1936.)
36. GELB, A. & GOLDSTEIN, K. Psychologische Analysen hirnpathologischer Fälle. X. Über Farbensamenamnesie. *Psychol. Forsch.*, 1924, **6**, 127-186. (Zbl. ges. Neurol. Psychiat., 1925, **60**, 577.)
37. GERSTMANN, J. Zur lokaldiagnostischen Verwertbarkeit des Syndroms: Fingeragnosie, Rechts-Links-Störung, Agraphie, Akalkulie. *Jb. Psychiat. Neurol.*, 1932, **48**, 135-143. (Zbl. ges. Neurol. Psychiat., 1932, **64**, 313-314.)
38. GERSTMANN, J. Zur Symptomatologie der Stirnhirnerkrankungen. *M Schr. Psychiat. Neurol.*, 1936, **93**, 102-110. (Zbl. ges. Neurol. Psychiat., 1937, **85**, 641.)
39. GIBBS, F. A. Frequency with which tumors in various parts of the brain produce certain symptoms. *Arch. Neurol. Psychiat., Chicago*, 1932, **28**, 969-989.
40. GOLDSTEIN, K. & GELB, A. Psychologische Analysen hirnpathologischer Fälle. I. Zur psychologie des optischen Wahrnehmungs- und Erkennungsvorganges. *Z. ges. Neurol. Psychiat.*, 1918, **41**, 1-142. (Zbl. ges. Neurol. Psychiat., 1919, **18**, 105-108.)
41. GOLDSTEIN, K. Über die Einfluss von Sprachstörungen auf das Verhalten gegenüber Farben. 7. *Psychol. Kongr.*, Marburg, 1921. (Zbl. ges. Neurol. Psychiat., 1921, **25**, 559.)
42. GOLDSTEIN, K. The modifications of behavior consequent to cerebral lesions. *Psychiat. Quart.*, 1936, **10**, 586-610.
43. GOLDSTEIN, K. The significance of the frontal lobes for mental performances. *J. Neurol. Psychopath.*, 1936, **17**, 21-40.
44. GOLDSTEIN, K. The significance of special mental tests for diagnosis and prognosis in schizophrenia. *Amer. J. Psychiat.*, 1939, **96**, 575-587.
45. GOLDSTEIN, K. *The organism*. New York: American Book Co., 1939.
46. GOLLA, F. L. Discussion on the mental symptoms associated with cerebral tumors. *Proc. Roy. Soc.*, 1931, **24**, 1000.
47. GRÜNTAL, E. Über Ähnlichkeiten zwischen organischer und schizophrener Denkstörung. *Z. ges. Neurol. Psychiat.*, 1931, **135**, 618-626.
48. GRÜNTAL, E. *Über die Erkennung der traumatischen Hirnverletzung*. Berlin: S. Karger, 1936. (Zbl. ges. Neurol. Psychiat., 1936, **83**, 267.)
49. GUIRDHAM, A. The Rorschach test in epileptics. *J. Ment. Sci.*, 1935, **81**, 870-893.
50. GUREWITSCH, M. Weitere Beiträge zur Lehre vom interparietalen Syndrom bei Geisteskrankheiten. *Z. ges. Neurol. Psychiat.*, 1933, **146**, 126-144. (Zbl. ges. Neurol. Psychiat., 1934, **70**, 362-363.)
51. HALSTEAD, W. C. Experimental analysis of the effects of prefrontal lobectomy in man. *Psychol. Bull.*, 1938, **35**, 687.
52. HALSTEAD, W. C. Preliminary analysis of grouping behavior in patients with cerebral injury by the method of equivalent and non-equivalent stimuli. *Amer. J. Psychiat.*, 1940, **96**, 1263-1294.
53. HARDWICK, R. S. Intelligence tests in a case of brain injury. *Psychol. Bull.*, 1927, **24**, 185.

- 54. HARROWER-ERICKSON, M. R. Changes in figure-background perception in patients with cortical lesions. *Brit. J. Psychol.*, 1939, 30, 47-51.
- 55. HARROWER-ERICKSON, M. R. Personality changes accompanying cerebral lesions. I. Rorschach studies of patients with cerebral tumor. *Arch. Neurol. Psychiat., Chicago*, 1940, 43, 859-890.
- 56. HARROWER-ERICKSON, M. R. Personality changes accompanying cerebral lesions. II. Rorschach studies of patients with focal epilepsy. *Arch. Neurol. Psychiat., Chicago*, 1940, 43, 1081-1107.
- 57. HEBB, D. O. Intelligence in man after large removals of cerebral tissue: Report of 4 left frontal lobe cases. *J. Gen. Psychol.*, 1939, 21, 73-87.
- 58. HEBB, D. O. Intelligence in man after large removals of cerebral tissue: Defects following right temporal lobectomy. *J. Gen. Psychol.*, 1939, 21, 437-446.
- 59. HEBB, D. O., & PENFIELD, W. Human behavior after extensive bilateral removal from the frontal lobes. *Arch. Neurol. Psychiat., Chicago*, 1940, 44, 421-438.
- 60. HENRY, G. W. Mental phenomena observed in cases of brain tumor. *Amer. J. Psychiat.*, 1932, 12, 514-473.
- 61. HOFF, H. & PÖTZL, O. Über ein neues parieto-occipitales Syndrom. (Seelenlähmung des Schauens—Störung des Körperschemas—Wegfall des zentralen Sehens.) *Jb. Psychiat. Neurol.*, 1935, 52, 173-218. (*Zbl. ges. Neurol. Psychiat.*, 1936, 80, 176-178.)
- 62. HOLMES, G. Disorders of sensation produced by cortical lesions. *Brain*, 1927, 50, 413-427.
- 63. HOLMES, G. ET AL. Mental symptoms associated with cerebral tumors. *Proc. Roy. Soc.*, 1931, 24, 65-76.
- 64. HORRAX, G. & PUTNAM, T. J. Distortions of visual fields in cases of tumor: Field defects and tumors producing hallucinations as of the occipital lobe. *Brain*, 1932, 55, 499-523.
- 65. HUNT, J. McV. & NICHOLS, I. C. A case of partial frontal bilateral lobectomy. *Amer. J. Psychiat.*, 1940, 96, 1063-1087.
- 66. HYLAND, H. H. & BOTTERELL, E. H. Frontal lobe tumors: A clinical and physiological study. *Canad. Med. Ass. J.*, 1937, 37, 530-540.
- 67. ISSERLIN, M. Über Störungen des Gedächtnisses bei Hirngeschädigten. *Z. ges. Neurol. Psychiat.*, 1923, 85, 84-97. (*Zbl. ges. Neurol. Psychiat.*, 1924, 34, 486-487.)
- 68. JASTROWITZ, M. Beiträge zur localisation im Grosshirn und über deren praktische Verwerthung. *Dtsch. med. Wchnschr.*, 1888, 14, 108.
- 69. JEFFERSON, G. Removal of right or left frontal lobes in man. *Brit. Med. J.*, 1937, 2, 199-206.
- 70. KARST, K. H. Nouvelles contributions au probleme des troubles psychiques dus a des lesions de la region frontale. *Med. Klin.*, 1938, 34, 88-89.
- 71. KENNEDY, F. Symptomatology of frontal and temporo-sphenoidal tumors. *J. Amer. Med. Ass.*, 1932, 98, 864-866.
- 72. KESCHNER, M., BENDER, M. B., & STRAUSS, I. Mental symptoms in cases of tumor of the temporal lobe. *Arch. Neurol. Psychiat., Chicago*, 1936, 35, 572-596.
- 73. KESSEL, F. K. Über Tumoren des Riechhirns. Ein kurzer Beitrag zur Kenntnis der Symptomatologie der Geschwülste des Schläfenlappens. *Mtschr. Psychiat. Neurol.*, 1934, 90, 94-112. (*Zbl. ges. Neurol. Psychiat.*, 1935, 75, 322-323.)
- 74. KHOROSHKO, V. K. [Method of psychologic syndromes in the study of injuries and functions of the frontal lobes of the brain.] *J. neuropat. i. psikiat.*, 1929, 22, 315-326. (*Zbl. ges. Neurol. Psychiat.*, 1930, 55, 387.)
- 75. KHOROSHKO, V. K. Doctrine des lobes frontaux d'apres trente annees de recherches personnelles. *Ann. Med.-psychol.*, 1935, 93, 383-401.

76. KLEIST, K. Gehirnpathologische und lokalisatorische Ergebnisse. Das Stirnhirn im engeren Sinne und seine Störungen. *Z. ges. Neurol. Psychiat.*, 1931, **131**, 442-452.
77. KLÜVER, H. The study of personality and the method of equivalent and non-equivalent stimuli. *Character and Personality*, 1936, **5**, 91-112.
78. KNAPP, P. C. The mental symptoms of cerebral tumors. *Brain*, 1906, **29**, 35-56.
79. KOLODNY, A. The symptomatology of tumours of the temporal lobe. *Brain*, 1928, **51**, 385-417.
80. KRAFF, E. E. & COURTIS, B. Síndrome optico espacial por lesión parietal (Apraxia, agrafia y acalculia "Constructivas." Alexia optico espacial.) *Cong. argent. de oftal.*, 1936, **2**, 369-379. (*Zbl. ges. Neurol. Psychiat.*, 1924, **35**, 396-397.)
81. KUENBURG, M. Über das Erfassen einfacher Beziehungen anschaulichem Material bei Hirnschädigten, insbesondere bei Aphasischen. Ein Beitrag zum Abstraktionsproblem. *Z. ges. Neurol. Psychiat.*, 1923, **85**, 120-163. (*Zbl. ges. Neurol. Psychiat.*, 1924, **35**, 396-397.)
82. LEMKE, R. Zur Diagnostik der Schläfenlappentumoren. *Arch. Psychiat. Nervenkr.*, 1934, **102**, 706-730. (*Zbl. ges. Neurol. Psychiat.*, 1935, **76**, 648-649.)
83. LIDZ, T. A study of the effect of right frontal lobectomy on intelligence and temperament. *J. Neurol. Psychiat.*, 1939, **2**, 211-222.
84. LLOYD, J. H. Meningeal tumors of the prefrontal region. *J. Nerv. Ment. Dis.*, 1892, **17**, 14-17.
85. MARCUS, H. Gedächtnisstörungen bei krankhaften Veränderung im Frontalhirn und in der Insula. *Z. ges. Neurol. Psychiat.*, 1926, **101**, 330-349.
86. MARIE, P. & FOIX, C. Les aphasies de guerre. *Rev. neurol.*, 1917, **31**, 53-87.
87. MARTEL, T. DE & VINCENT, C. Les hallucinations visuelles dans les tumeurs temporales avec trois observations. *Rev. neurol.*, 1930, **1**, 203-207.
88. MESSIMY, R. & GERMAN, W. J. Clinical study of prefrontal lobe function. *Yale J. Biol. Med.*, 1938, **10**, 455-471.
89. MINSKI, L. The mental symptoms associated with fifty-eight cases of cerebral tumor. *J. Neurol. Psychopath.*, 1933, **13**, 330-343.
90. MIXTER, W. J., TILLOTSON, K. J. & WIES, D. Reports of partial frontal lobectomy and one frontal lobotomy performed on three cases: One chronic epileptic and two cases of chronic agitated depression. *Psychosom. Med.*, 1941, **3**, 26-37.
91. MOERSCH, F. P. Psychic manifestations in cases of brain tumors. *Amer. J. Psychiat.*, 1924, **4**, 705-724.
92. MONAKOW, C. VON. *Lokalisation im Grosshirn und der Abbau der Funktion durch corticale Herde*. Wiesbaden: I. F. Bergmann, 1914.
93. NADEL, A. B. A qualitative analysis of behavior following cerebral lesions diagnosed as primarily affecting the frontal lobes. *Arch. Psychol., N. Y.*, 1938, **32**, No. 224. Pp. 60.
94. NIELSEN, J. M. & VON HAGEN, K. O. Mind blindness (visual agnosia); Case due to softening in occipital lobes. *J. Nerv. Ment. Dis.*, 1936, **84**, 386-398.
95. NIELSEN, J. M. & RANEY, R. B. Recovery from aphasia studied in cases of lobectomy. *Arch. Neurol. Psychiat., Chicago*, 1939, **42**, 189-200.
96. NONNE, M. Zur Klinik der Stirnhirn-Tumoren. *Med. Klin.*, 1927, **23**, 1-3. (*Zbl. ges. Neurol. Psychiat.*, 1927, **47**, 419.)
97. OBERHOLZER, E. Zur Differentialdiagnose psychischer Folgezustände nach Schädeltraumen mittels des Rorschachschen Formdeutversuchs. *Z. ges. Neurol. Psychiat.*, 1931, **136**, 596-629.
98. O'BRIEN, J. D. Removal of the right cerebral hemisphere: Case report. *Ohio State Med. J.*, 1932, **28**, 645-649.

99. O'BRIEN, J. D. Further report on case of removal of right cerebral hemisphere. *J. Amer. Med. Ass.*, 1936, 107, 657.
100. OPPENHEIM, H. Zur Pathologie der Grosshirngeschwülste. *Arch. Psychiat. Nervenschr.*, 1889, 21, 705-745.
101. PENFIELD, W. & EVANS, J. Functional defects produced by cerebral lobectomies. *Res. Publ. Ass. Nerv. Ment. Dis.*, 1934, 13, 352-377.
102. PENFIELD, W. & EVANS, J. The frontal lobe in man: A clinical study of maximum removals. *Brain*, 1935, 58, 115-133.
103. PFEIFER, B. Psychische Störungen bei Hirntumoren. *Arch. Psychiat. Nervenkr.*, 1910, 47, 558-738.
104. PIOTROWSKI, Z. Rorschach studies with lesions of the frontal lobes. *Brit. J. Med. Psychol.*, 1937, 17, 105-118.
105. PIOTROWSKI, Z. The Rorschach Inkblot Method in organic disturbances of the central nervous system. *J. Nerv. Ment. Dis.*, 1937, 86, 525-537.
106. POPPELREUTER, W. Über psychische Ausfallerscheinungen nach Hirnverletzungen. *Munch. Med. Woch.*, 1915, 62, 489-491. (*Zbl. ges. Neurol. Psychiat.*, 1916, 12, 240.)
107. POPPELREUTER, W. *Die psychischen Schädigungen durch Kopfschuss*. Leipzig: Voss, 1917.
108. RORSCHACH, H. *Psychodiagnostik*. (2nd ed.) Berne: Hans Huber, 1932.
109. ROTHMANN, E. Untersuchung eines Falles von umschriebener Hirnschädigung mit Störungen auf verschiedensten Leistungsgebieten. *Schweiz. Arch. Neurol. Psychiat.*, 1934, 33, 35. (*Zbl. ges. Neurol. Psychiat.*, 1934, 73, 675.)
110. ROWE, S. N. Verified tumor of the temporal lobe: A critical review of fifty-two cases. *Arch. Neurol. Psychiat.*, Chicago, 1933, 30, 824-842.
111. ROWE, S. N. Mental changes following the removal of the right cerebral hemisphere for brain tumor. *Amer. J. Psychiat.*, 1937, 94, 605-614.
112. RUBIN, E. *Visuell wahrgenommene Figuren*. Copenhagen: Glydendalske Boghandel, 1921.
113. RUFFIN, H. Stirnhirnsymptomatologie und Stirnhirnsyndrome. *Fortschr. Neurol. Psychiat.*, 1939, 11, 34-52. (*Zbl. ges. Neurol. Psychiat.*, 1939, 94, 259-260.)
114. RYLANDER, G. *Personality changes after operations on the frontal lobes: A clinical study of thirty-two cases*. Copenhagen: Ejnar Munksgard, 1939.
115. SACHS, E. Symptomatology of a group of frontal lobe lesions. *Brain*, 1927, 50, 474-479.
116. SACHS, E. Lesions of the frontal lobe: A review of forty-five cases. *Arch. Neurol. Psychiat.*, Chicago, 1930, 24, 735-742.
117. SAVITSKY, N. Further comments on head injury—postconcussion syndrome. *N. Y. State J. Med.*, 1934, 34, 909-914.
118. SCHILDER, P. Fingeragnosie, Fingerapraxie, Fingeraphasie. *Nervenarzt.*, 1931, 4, 625-629.
119. SCHILDER, P. *Brain and personality*. New York: Nervous and Mental Disease Publishing Co., 1931.
120. SCHUSTER, P. *Psychische Störungen bei Hirntumoren*. Stuttgart: F. Enke, 1902.
121. SCHWAB, S. I. Changes in personality in tumors of the frontal lobe. *Brain*, 1927, 50, 480-487.
122. SHAMBOOROV, D. A. [Clinical manifestations of tumor of the frontal lobe.] *Opukh. centraln. nervn. sist.*, 1936, p. 63. (*Arch. Neurol. Psychiat.*, Chicago, 1938, 39, 399.)
123. STAUDER, K. H. *Konstitution und Wesensänderung der Epileptiker*. Leipzig: George Thieme, 1938. (Ref.: Harrower-Erickson, M. R. *Arch. Neurol. Psychiat.*, Chicago, 1940, 43, 1081-1107.)

124. STIEF, S. & CSAJAGHY, M. [A case of cerebral localization of mirror-writing in the left inferior parietal lobe.] *Orvosi. hetil.*, 1936, 80, 503-504. (*Zbl. ges. Neurol. Psychiat.*, 1936, 82, 558.)
125. STONE, L. Paradoxical symptoms in right temporal lobe tumor. *J. Nerv. Ment. Dis.*, 1934, 79, 1-13.
126. STRAUSS, I. & KESCHNER, M. Mental symptoms in cases of tumor of the frontal lobe. *Arch. Neurol. Psychiat.*, Chicago, 1935, 33, 986-1007.
127. TALLMAN, G. & KLOPPER, B. Rorschach study of a bilateral lobectomy case. *Ror. Res. Exch.*, 1937, 1, 77-89.
128. Terman, L. M. *The measurement of intelligence*. Boston: Houghton Mifflin Co., 1916.
129. TORKILDSEN, A. [Clinical symptoms in temporal and occipital tumors.] *Norsk. mag. f. laegevidensk.*, 1938, 99, 996-1013. (*Zbl. ges. Neurol. Psychiat.*, 1939, 92, 193.)
130. VORIS, H. C. Tumor of the frontal lobe: Anatomic, pathologic, and clinical analysis. *Proc. Mayo Clin.*, 1934, 9, 396-400.
131. VORIS, H. C., ADSON, A. W., & MOERSCH, F. P. Tumors of the frontal lobe: Clinical observations in a series verified microscopically. *J. Amer. Med. Ass.*, 1935, 104, 93-99.
132. WAGNER, W. Über Raumstörung. *Msehr. Psychiat. Neurol.*, 1932, 84, 281-307. (*Zbl. ges. Neurol. Psychiat.*, 1933, 68, 631.)
133. WAGNER, W. Scheitellappensymptome und das Lokalisationsprinzip. (Untersuchungen über Apraxie und verwandte Symptome.) *Z. ges. Neurol. Psychiat.*, 1937, 157, 169-205. (*Zbl. ges. Neurol. Psychiat.*, 1937, 86, 68-69.)
134. WEIGL, E. Zur Psychologie sogenannter Abstraktionsprozesse. Untersuchungen über das Ordnen. *Z. Psychol.*, 1927, 103, 2-45. (Trans. by M. J. Rioch., *J. abnorm. soc. Psychol.*, 1941, 36, 3-33.)
135. WERNER, H. & STRAUSS, A. A. Pathology of figure-background relations in the child. *J. Abnorm. Soc. Psychol.*, 1941, 36, 236-248.
136. WILLIAMSON, R. T. On the symptomatology of gross lesions (tumors and abscesses) involving the prefrontal region of the brain. *Brain*, 1896, 19, 346-365.
137. WIMMER, A. Über Charakter- und Temperamentsänderungen nach Stirnhirnverletzungen. *Allg. Z. Psychiat.*, 1926, 84, 451-459. (*Zbl. ges. Neurol. Psychiat.*, 1926, 43, 876.)
138. WORCHEL, P. and LYERLY, J. G. Effects of prefrontal lobotomy on depressed patients. *J. Neurophysiol.*, 1941, 4, 62-67.

CERTIFICATION OF PSYCHOLOGISTS IN CONNECTICUT

KARL FLORIEN HEISER

Hartford, Connecticut

The war years are stimulating an awakening of interest among psychologists in the social role and applications of their science. It is difficult to imagine that they will quickly leave the arena of social problems and return to their preoccupation with academic teaching and theoretical research. It may be expected that many psychologists will maintain their interests in and contributions to the practical and social problems of our time.

Those psychologists who concern themselves with the results and by-products of this situation are inclined to see that the broader utilization of psychology is working in three directions:

1. An increase in the number of positions available to psychologists.
2. An increase in the number and proportion of college graduates who will seek their life work in psychology.
3. An increase in monetary rewards for psychological services.

While, in general, these tendencies may seem gratifying, they pose important problems for the profession and may be said to constitute the framework within which Connecticut psychologists have taken the steps, described below, toward the control and recognition of adequate professional standards.

The Connecticut Certified Psychologists Act, is as follows:

State of Connecticut House Bill No. 400

AN ACT REGULATING THE USE OF THE TITLE 'CERTIFIED PSYCHOLOGIST'

Be it enacted by the Senate and House of Representatives in General Assembly convened:

Section 1. Board of examiners. On or before July 1, 1945, the governor shall appoint three psychologists whose qualifications shall be not less than those specified in subsections (a), (b), (c) and (d) of section four of this act, to be members of the board of examiners of psychologists, one to hold office for one year, one for two years and one for three years, from said July first; and annually thereafter he shall appoint for a term of three years, and until his successor is appointed and qualified, a psychologist, certified according to the provisions of this act, to replace the member whose term expires. Each such member shall be an elector of this state and shall have engaged in the practice of psychology for at least five years. The governor shall designate one member as chairman of said board of examiners and shall fill any vacancy therein by a certified psychologist for the unexpired portion of the term. He may remove any such member, after notice and hearing, for incompetence, neglect of duty or malfeasance in office. Two members of the board shall be a quorum. Each member shall receive his necessary expenses incurred in the performance of the duties required by this act.

Section 2. Report. Office. Regulations. The board shall report in writing, annually on June thirtieth, to the governor. Such report shall include the names of all psychologists to whom certificates have been granted as provided in sections four and five of this act, any cases heard and decisions rendered in relation to the doings of said board of examiners, the recommendations of the board as to future policies, the names, remuneration and duties of the employees of the board and an account of all moneys received and expended by it. Each member of the board shall review and sign such report before its submission to the governor. The principal office of the board shall be in Hartford but it may meet or conduct any of its business at any place in this state. The board may em-

power any member to conduct any proceeding, hearing or investigation necessary to its purposes.

Section 3. Registration of educational institutions. The secretary of the state board of education shall register any educational institution if he approves the standards maintained by it and its requirements precedent to the granting of degrees presented for a certificate as a psychologist. In making such a determination, said secretary shall be guided by the advice of said board of examiners and any other factors he considers material to his decisions. Such decisions in regard to any institution may be reconsidered at any time.

Section 4. Certification. No person shall use the title "Certified Psychologist" in this state without a certificate granted by said board of examiners and signed by each member thereof. Before granting any such certificate the board may require any applicant therefor to pass a written examination in psychology to be given at such time and place and under such supervision as the board prescribes. Such applicant shall pay a fee of fifteen dollars and shall satisfy the board that he (a) is at least twenty-one years of age; (b) is of good moral character; (c) is a citizen of the United States or has legally declared his intention of becoming one; (d) has received a degree of Doctor of Philosophy in psychology from an educational institution registered as provided in section three of this act, or, in lieu of said degree, a doctorate degree in education from an institution so registered if it is the opinion of all members of the board that the training required therefor is substantially similar; (e) has had at least one year's experience of a type satisfactory to the board in the practice of psychology and (f) has not within the preceding six months failed an examination given by the board. The board shall grade the examinations returned by the candidates and shall keep them for at least one year. Any unsuccessful candidate may, upon written request to the board, see his graded paper.

Section 5. Certification under special conditions. The board may grant a certificate upon payment of a fee of fifteen dollars to any person who applies therefor within two years from the passage of this act who meets the requirements of subsections (a), (b), (c) and (d) of section four hereof, provided the board may waive either an examination or the requirements of subsection (d) if it deems such action to be in the public interest, who is qualified by experience to practice psychology and who had been engaged in such practice at least three years at the time of the passage of this act. The board may grant a certificate without examination to any person who at the time of application is licensed or certified by a similar board of another state whose standards, in the opinion of the board, are not lower than those required by this act, or who has been practicing psychology in another state for at least three years and is able to satisfy the board that to grant him a certificate would be in the public interest.

Section 6. Suspension or revocation of certificate. The board may revoke any such certificate or suspend the same for a definite period not to exceed one year if the certificate holder has been convicted of a felony or has been found by the board to have employed fraud or deceit in obtaining his certificate or to have acted negligently or wrongfully in the conduct of his profession. After three years from the date of a revocation, an application for reinstatement may be made to the board, and it may, upon favorable action by the majority of its members, grant such reinstatement. Notice of a contemplated revocation or suspension, of the cause therefor and the date of hearing thereon, shall be mailed to the holder of such certificate at his last-known address at least fifteen days before the date of such hearing. No certificate issued under this act shall be revoked or suspended without such hearing, but the nonappearance of the holder of such certificate, after notice, shall not prevent such hearing. Any person whose certificate has been revoked or suspended may, within thirty days after such revocation or suspension, appeal therefrom to the superior court for Hartford county. Such appeal shall be accompanied by a citation to said board to appear before said court. Such citation shall be signed by

the same authority and such appeal shall be returnable at the same time and served and returned in the same manner as is required in the case of a summons in a civil action. No such appeal shall operate as a supersedeas to such revocation or suspension.

Section 7. False representation. Any person not certified as provided in this act who designates himself or his occupation by the words "certified psychologist," or by any other term which implies that he is a certified psychologist, shall be fined not more than five hundred dollars. The board may investigate any alleged violation of the provisions of this act.

Section 8. This act shall take effect from its passage.

The Connecticut Certified Psychologists Act is the product of discussion, planning and cooperation between members of the Connecticut Valley Association of Psychologists and the Connecticut State Psychological Society over a period of 16 months. The following discussion is limited to the consideration of the merits of the Connecticut legislation and of the practical steps taken to secure its enactment. Since such legislation is probably desirable in other states, it is hoped that our experience and methods will be helpful.

In the preliminary discussions it was decided that the following objectives should be sought:

1. Statutory recognition of professional standards and training of psychologists.
2. The general recognition of the doctorate as the professional degree.
3. A means by which employers and the public might better discriminate among psychologists, at least in respect to professional knowledge and training.

These decisions were quite an accomplishment in themselves, simple as they seem. This will be recognized by any one who joins a group for serious discussion of professional problems.

Many psychologists prefer the alternative, to statutory regulation, of control by professional groups themselves. Such regulation already exists in the standards for admission to our various professional organizations. Such standards are necessary within the profession, but they do little for the public or for the individual psychologist in his dealings with the public.

While no one would claim that the Ph.D. is a guarantee of professional competence, it is believed by the majority that it denotes a standard of training and ability that should be achieved by all who wish to assume professional responsibilities in their relations to the public.¹ This may seem unfair to those hundreds of people who are giving satisfactory services yet have only their Master's degree, but it is felt that, in the long run, both the public and the profession will benefit from the higher standards, used not as a means of exclusion and restriction of the profession to a limited number, but for the expansion of the demand for psychologists through the demonstration of their high value.²

¹ The Connecticut statute provides that this requirement can be waived during the first two years the statute is in force in the case of psychologists of established standing who have had three years of professional experience.

² It is the writer's opinion that, until the profession has come to general agreement on the standards and classification of psychological services, such titles and positions as psychometrist, psychological examiner, and assistant psychologist should be discouraged and that college departments should cease advising their young graduates that they may go into the interesting field of mental testing with the M.A. degree or less. It is neither good science, nor good professional practice for such persons, in the name of psychology, to report test results to employers, parents, etc., who are seldom able to make proper use

The decision to limit certification to basic training and general ability rather than to attempt to set up standards for certification of several areas, such as clinical and industrial psychology, was due to the lack of professional agreement on duties, necessary training and standards of such specialists.

With these objectives agreed upon, the next steps were the construction of the statute itself; the decisions as to just what a bill should contain. These steps were taken by the discussion of Britt's "Model Act"³ and of several constructions by members of the local committee. It was decided that the bill should provide for:

1. *Certification rather than licensing.* (See ¶. 1 below.)
2. *An independent examining board with authority to issue and revoke certificates in the name of the state.* (See ¶. 2 below.)
3. *A standard of training and experience based upon the doctorate.* (See ¶. 3 below.)
4. *A method of accrediting graduate schools whose degrees may be presented in application for a certificate.* (See ¶. 4 below.)
5. *A penalty for violation of the act.* (See ¶. 5 below.)

1. It was agreed that the status of psychology does not justify a strict definition of psychological practice, competence or training, and that neither professional nor lay agreement could be secured in support of legislation which would deny the practice of psychology to those without a license. The approach to the control of standards must be made, therefore, through legislation which sets a good standard, the merits of which the profession and the public may, in time, appreciate. The Connecticut Act, therefore, is comparable to those which cover accountancy and distinguish between Certified Public Accountants and others, without restricting the practice of accounting.

2. There was strong agreement that the control of licensing be in the hands of professional psychologists responsible only to the Governor. There was some feeling by others that certification should be done by the Commissioner of Education who could appoint the examining board and regulate its policies in compliance with the law. This opinion was based partly on the fact that the Department of Education already has a certification system for school psychologists, psychological examiners and examiners in training who handle testing and special problems in the schools. Although the relative isolation of most psychologists from those who are engaged in psychological practice in schools and other agencies should be deplored, it was felt that the independent determination of standards by the professional group still is necessary. The encouragement of cooperation and discussion of mutual interests between the professional groups and those engaged in practical work in schools and industry should be undertaken, but it is a separate problem.

3. The standard of training based upon the doctorate was determined upon with general agreement largely because the Connecticut State Psychological Society, which undertook the responsibility for getting the legislation passed, has the Ph.D. as a requirement for its own membership. The state society includes 55 of the 60 psychologists in Connecticut who are qualified for membership. Altogether, about 120 persons in Connecticut are listed as associate or full members in A.P.A.

4. The accrediting of graduate schools whose degrees may be presented in application for certification is an onerous task. Though the examining board might undertake

of them. Psychologists are not to be blamed for the over expansion, commercialization and weaknesses of the mental testing movement, yet they should not have been so ready to use it as a means of placement of thousands of young majors who are eager to be of social service in this limited vocational field.

³ Britt, S. H. Model "Certified Psychologists' Act." *J. cons. Psychol.*, 1939, 3, 123-127.

this responsibility, several good reasons were advanced for having the accrediting handled by the State Department of Education which already provides this service for a few other professional groups. The agreement on this procedure was secured in conference with the Commissioner of Education and the Act as passed delegates this power to the State Department of Education with the advice of the examining board. This policy is a desirable one for Connecticut, but may not be advisable in some other states. The determining factors should be whether or not (1) the State Department of Education appreciates and is committed in practice to high professional standards; (2) greater professional and public confidence may be had in the certification procedure, and (3) it aids in the passage of the act by the legislature.

5. It was agreed that if certification is to mean anything there must be a real penalty and provisions for enforcing it in cases of violation of the Act. The size of the penalty, (from suspension and revocation to a \$500 fine, in the Connecticut Act), should depend upon precedent in other similar statutes, and upon the seriousness of violations and upon the respect which may be gained for certification. Too small a penalty would indicate that certification is of little significance.

Having agreed upon the provisions of the Act, the state Society appointed a five member legislative committee charged with getting the Act passed by the legislature. The first step was to secure the endorsement of 125 prominent citizens in the fields of government, welfare, medicine, industry and science.

As a wise precaution, the bill was taken to a member of the staff of the Statute Revision Commissioner, thru whose office all bills go for editing and examination, for help and advice in the actual wording of the bill so that its language and construction would be according to precedent and without irregularities that might be picked upon by any legislator who opposed the bill. Since psychologists are seldom experienced in legislative procedures, the desirability of this step cannot be over-emphasized.

These endorsements, together with a copy of the bill and a letter of explanation from Walter R. Miles, president of the state Society, were sent to the Legislative Council, a body of legislative leaders of both parties who develop and present what they consider to be the most important and urgent legislation. This step was taken to plant the idea in the minds of a few political leaders and to forestall their possible opposition to a measure of which they had no understanding, rather than in the hope that they would themselves undertake its passage as an important bill. As expected, the Legislative Council politely expressed its regret that it could not undertake this bill because of prior and more pressing legislative matters, but it looked with favor upon the objectives of the bill and suggested that a representative or senator might be willing to present it.

A representative with several terms of legislative experience, supported by both parties in his constituency and with a reputation for good judgement and support for legislation in the public interest was asked to present and support the bill. After study of the bill, he became in hearty agreement with it and gave it conscientious and consistent support.

Upon introduction and reading in the House of Representatives, the bill was referred to the Committee on Licensed Occupations, a group made up of members of the House and Senate. Since the passage of most legislation is determined in committee, all efforts were concentrated upon getting approval of the 17 committee members, especially the two chairmen. Letters of explanation and endorsement were sent by several psychologists to the committee, and the chairman of the state Society's legislative committee called upon several committee members personally. At the public hearing on the

bill, Representative E. O. Smith, who presented the bill, gave it strong endorsement and presented the signatures of the 125 endorsers. Three leading psychologists were prepared and spoke in favor of the bill. They presented in simple and brief language the merits of the legislation. Many more psychologists were present, and it was pointed out that they would be glad to speak in favor of the bill, but would not do so in the interest of conserving the committee's time.

The problem of getting a favorable hearing is very important and crucial. Psychologists and legislators speak a different language. In speaking to a legislative committee, the psychologist must remember that he is speaking to an intelligent group which, however, contains very few members who have had college training and probably none who have as much understanding of scientific psychology as the college student after his first week in the elementary course. Yet, in a few minutes time, the psychologist must present his profession in such a way as to engender an intelligent point of view and to avoid quibbling and questions for which there is no feasible answer in such a situation. The psychologist must be prepared for questions on psychoanalysis and he must remember that in the statutes of most states, when mentioned at all, he is classed with faith healers and spiritualists!

After the committee hearing, the usual procedure is for the committee to discuss a bill and to vote to report it favorably or unfavorably. It is frequently the case that a bill which is controversial or which has little public support, or which seems insignificant is held in committee without action. Or a committee may wish to amend a bill, in which case its proponents must be ready to give quick consideration to the proposed amendment and must be delegated with limited authority to decide between amendment of the bill, possible defeat, or support of the original wording. The Connecticut bill was held for two months without action by the committee. Finally objection was taken to the provision that the Governor appoint the examining board from a list of psychologists nominated by the state Society. This objection was quickly met by rewriting the first section of the bill and by discussion with the committee chairmen. The bill was brought up for vote the next day and was unanimously reported favorably to the House. When taken from the calendar for action, three days later, the psychologists in the gallery held their breath while the Licensing Committee chairman, who moved the bill's passage, eulogized the profession and said that this bill would not conflict with any other professions as the psychologists "just looked after ventilation and industrial problems and administered drugs, etc." The bill passed the House!

The following week the bill came up for vote in the Senate where its proponent explained that "psychiatrists treat the body while the certified psychologists would deal only with the mind!" On the vote to pass, the "ayes" had it.

Since the signing of the bill by the Governor seemed probable, the state Society polled all persons listed by APA in the state to get their preferences for membership on the examining board. The Governor signed the bill on July 19, 1945 and the six most preferred names were sent to him as the Society's suggestions, of whom the Governor appointed Dr. Marion A. Bills, Dr. Karl F. Heiser and Dr. Walter A. Miles as chairman.

While the act will not of itself raise and insure high standards of psychological work in Connecticut, and while alternative and more specific legislation should be considered, it is believed that it represents the best and most feasible step for the present. Elsewhere, e.g., New York, psychologists have achieved definition of standards through such acts as those which cover authority to commit to state institutions. In some states it may be felt that legislation should

distinguish between different grades or levels of professional competence or should define and set standards in a limited field such as clinical psychology.

It is the writer's opinion that the Connecticut Act is a desirable step, on the basis of which it should be relatively easy to pass future legislation requiring that psychologists pursuing certain functions shall be certified psychologists.

As a result of experience, the following points seem worthy of mention for their possible value to legislation-minded psychologists in other states:

1. At least a year should be spent in committee work and discussion among all who are currently recognized as psychologists.
2. There should be a recognized state-wide organization to sponsor and support legislation.
3. Discussion and debate should not be prolonged in the attempt to satisfy everyone. Approval by 75 per cent of those concerned is probably sufficient for proceeding, if they are in active, informed agreement.
4. A special small committee should be given responsibility and authority within limits set by the state group to decide upon particular legislative procedures. Members of this committee must be willing to write letters and able to "make friends and influence people." Personal contact with key legislators is essential.
5. Some support from outside the profession is probably necessary.
6. A clear exposition of the public benefit of the legislation, rather than its value to the profession, must be given.
7. The act should be so drawn that its operation (i.e. collection of fees for certification) will provide sufficient income to defray all expenses.

NOTICE

BUSINESS MEETING OF THE AMERICAN PSYCHOLOGICAL ASSOCIATION Columbus, Ohio, December 27-29, 1945

A business meeting of the American Psychological Association will be held December 27-29 at the Fort Hayes Hotel, Columbus, Ohio. Members of the new Council of Representatives, and officers of the various divisions will meet to plan the organization of the divisions and to transact other business. Several of the working committees of the APA also plan to meet at the same time. There will be no program of papers, but any members of the APA who are interested are invited to attend meetings of the Council. Reservations at the hotel may be obtained as long as they are available from DR. DAEL WOLFLE, *Executive Secretary, 2101 Constitution Avenue, Washington 25, D. C.*

PSYCHOLOGY AND THE WAR

Edited by

DONALD G. MARQUIS

CONTENTS

NAVAL AVIATION PSYCHOLOGY. I. THE FIELD SERVICE ORGANIZATION, by <i>John G. Jenkins</i>	631
PSYCHOLOGICAL TEST CONSTRUCTION & RESEARCH, BUREAU NAVAL PERSONNEL: VALIDITY OF THE BASIC TEST BATTERY, FORM 1, FOR SELECTION FOR TEN TYPES OF ELEMENTARY NAVAL TRAINING SCHOOLS, by <i>Staff, Test & Research Section, Training, Standards & Curriculum Division, Bureau of Naval Personnel</i>	638
DETECTING PSYCHONEUROTIC TENDENCIES IN ARMY PERSONNEL, by <i>Howard E. Page</i>	645
A COMPARATIVE STUDY OF FOUR SCREENING TESTS FOR NEUROTICS, by <i>H. J. Eysenck</i>	659
CHINESE PILOTS' ATTITUDES TOWARD WAR, by <i>Yun En T'an</i>	663
PSYCHOLOGY AND THE WAR: NOTES	666
COMMITTEE ON THE RELOCATION OF MILITARY PSYCHOLOGISTS	
TRANSFER OF CLINICAL PSYCHOLOGICAL SERVICES FROM THE ADJUTANT GENERAL'S DEPARTMENT TO THE MEDICAL DEPARTMENT	

NAVAL AVIATION PSYCHOLOGY. I. THE FIELD SERVICE ORGANIZATION

JOHN G. JENKINS

Commander, H(S), USNR

During the period that has elapsed from the summer of 1940 to date, more than 100 psychologists have served under the cognizance of the Aviation Psychology Section of the Navy's Bureau of Medicine and Surgery. At the present time, approximately 90 names appear on its roster.

In describing the activities and accomplishments of this group, it is essential to point out that no single homogeneous function for the entire roster has ever existed. Although all the above personnel were originally procured to aid in a program of selecting aviation cadets, differentiation of function was quickly established. As time went on, four more or less clearly demarcated functions arose, each served by its own group of aviation psychologists. These are as follows: 1. The field service group, 2. The procurement and selection group, 3. The special services group, and 4. The central research groups.

It is planned to describe each of these groups in a separate article, noting certain general outcomes achieved by the activities of the group in question. Detailed and specific discussion of outcomes and techniques will have to await the further development of policy in this regard by the Navy Department.

The Field Service Organization. The status of the field service organization in 1941-42 may be briefly stated. A few psychologists had been procured by

the Bureau of Medicine and Surgery for assignment to training facilities under the conviction that they could be of help in giving tests "and in other ways." The test program, to be described in a later article, was definite; and it had representation within the central structure of the Bureau. The "other ways of being useful" had not been thought out; they represented little more than a conviction that psychologists, since they dealt with human behavior, must be able to do something besides administer tests.

The psychologists commissioned during the earlier years* of the program found themselves in a thoroughly amorphous status when they reported for duty. They arrived at peripheral training activities (pre-flight schools, flight preparatory schools, primary training bases, gunnery schools, etc.) unable to define their own place in the military organization and unable to find anyone else who could define it. The administration, scoring, and interpretation of tests took at most a few hours out of a working week. The rest of the time they were free to "do whatever a psychologist did." Since the Commanding Officer ordinarily had no idea what psychologists could do—and since the psychologists ordinarily had little idea what their local training unit was trying to accomplish—the first weeks on duty were commonly more or less traumatic.

The story of the 3½ years of wartime development offers much evidence that psychologists are a relatively tough breed. Almost without exception they survived this initial trauma and began to learn enough about the function of their local organization to see where their training and point of view could be of unique service. Frequently this exploratory period was begun by accepting any task which would bring them into closer contact with the cadets and with the training procedures. Aviation psychologists volunteered to serve as Records Officers, as Bond Allotment Officers, as Welfare Officers, and, in various guises, as Personnel Officers. They taught classes in subjects that were definitely non-psychological, such as navigation and "Essentials of the Naval Service." Almost to a man, they discarded any worry as to whether a given task was appropriate for a Ph.D. or for a psychologist and began to weave themselves firmly into the local fabric. In many cases, they attended a full syllabus of courses in which aviation cadets were registered, simply to gain improved insight into the problems the cadets had to face.

Let it be said again that they did this with a minimum of central guidance and instruction from any source. There was a central administrative authority. Representatives of this authority made such visits to the various training facilities as the situation permitted. With such a large number of training centers, however, and with a small number of representatives of central administration,

* In a recent volume, E. G. Boring dismisses psychological activities in the Navy with the statement that "The Navy, though starting later than the Army, developed a similar program of classification and training under the Bureau of Naval Personnel." (Psychology for the Armed Services, National Research Council, 1945, 18.) In so doing he ignores the fact that more than 200 psychologists were commissioned under the auspices of the Bureau of Medicine and Surgery, divided approximately equally between programs in neuro-psychiatry and aviation psychology. He also ignores the fact that the program of commissioning psychologists was begun in the Navy as early as July of 1940, followed by calls to active duty in that same year. Since the volume in question purports to offer a review of psychology in the Armed Services, it is to be regretted that the author failed completely to inform himself regarding a program which involved approximately 20% of the 986 psychologists named as being in uniform and which was actually one of the first to get under way.

these visits were usually supportive rather than directive in function. Correspondence was permitted and what could be accomplished by writing received due attention. The main responsibility, however, rested squarely on the shoulders of the local psychologist; and the credit for accomplishment should be apportioned accordingly.

At the conclusion of the war, the record speaks for itself. Psychologists are at work in a wide variety of aviation training facilities. At times all have suffered somewhat from the exigencies of the war. In certain localities, a change in cognizant officers has seen the psychologist displaced from a position of high importance which he had earned by his own efforts. Sometimes this has been temporary, as the cognizant officer proved flexible enough to realize that new functions had appropriately accrued to a type of specialist hitherto unknown in the Navy. Occasionally the situation has not improved during the tenure of a particular officer. In the main, however, the trend had been unmistakably clear. In the main, the psychologist has earned for himself a unique position as a professional man essential to the program for the training of naval aviators and the personnel serving aloft with them.

It is to the credit of the Navy, as well as the psychologists, that this is so. Since we have reached a postwar, "now-it-can-be-told," stage, it may be said that many of those who accepted commissions, did so with considerable misgiving. All had heard tales of Service bureaucracy, or Service inflexibility, and of a dogged adherence to the traditional and the conventional. Naturally, these tales were not without foundation; there are stupid men in uniform as well as on university faculties. On the other hand, the record speaks for itself. Aviation Psychologists could not have achieved their present status unless their potential value had been appreciated by men of high intelligence, keen insight, and good faith in positions of importance throughout the naval organization.

In delineating the functions the aviation psychologist obtained through four years of evolution, the writer is constrained to point out that no small number of the psychologist's activities grew as much from his training in orderly thinking as they did from any training peculiar to psychology. Thus one man earned for himself a place of importance on an Aviation Safety Board. His Commanding Officer described his function by remarking that he was the "Thinking Member of the Board." His training in thinking in non-magical terms was a source of continuing interest to an earnest group of intelligent men who were unaccustomed to the rigorous demands of research intellection.

Another Aviation Psychologist—to limit the exhibit to two cases in the interest of space alone—finally achieved a place from which he was asked to review critically a local program of specialized training for aircraft gunners. The program suffered badly from over-intellectualization; it lacked integration of its component unit-courses; and it labored under a non-distributive system of grading. Almost single handed, the officer in question was able to bring these things up for review. His critical thinking was offered in the best tradition of Alexander Pope, with many "things unknown proposed as things forgot." Appropriate changes were made. More important, they were made in ways which gained firm local support from the training officers involved. To round out the picture, it may be remarked that a second school requested the services of this psychologist, with the result that he was able to repeat the entire performance at a school located some 5000 miles away from the original locus—and with equal success.

The selection of two examples should not be taken to imply that training in orderly thinking proved to be of value only in isolated instances. It is eternally

to the credit of the many graduate schools represented in the roster of Naval Aviation Psychologists that thinking of this type molded local operations in so many different localities.

A second contribution is as loosely tied to the peculiar nature of psychology as is the first contribution named above. Psychologists are trained in quantitative thinking, often in the form of statistical analysis. It has been a stimulating experience to many of our group to watch intelligent Navy officers, themselves untrained in quantification, learn how beautifully the simpler statistical methods can point a precise finger where unguided native intelligence provides only a formless suspicion that all is not well. There has, indeed, been little need to "sell" statistics; the problem has ordinarily been that of pointing out the inherent limitations of statistical analysis, once a case has been made for its use.

The non-statistical individual, after all, finds himself pretty helpless when confronted with a report which states that white horses eat more than black horses. He would like to invoke the aid of the statistician but suffers from a common phobia that statistics involves only an incomprehensible type of meretricious magic. Once he has been shown the results of computing total equine populations according to albedo and establishing per capita consumption, he feels himself enriched. The local psychologist has been wise in his approach here. He may have donned the black robe and done inverted factor analysis behind the doors of his own office, but he has presented his final outcomes in terms so simple that the auditor could check the results, if he wished, by personal re-computation.

As the writer reviews the contribution of these Naval Aviation Psychologists he is impressed by the fact that training in orderly thinking and training in quantitative thinking have bulked large in moving them towards positions of local responsibility. To say this is not to deride their contributions as psychologists; it is rather to remark that graduate training over the country as a whole cannot be as impoverished as certain alarmists would have led us to suppose. Psychology may or may not be a science. It must be said, however, that a group of men trained in this discipline have shown themselves to be capable of attacking practical problems in a way that befits the scientist!

On the more peculiarly psychological side, the local contributions of these men have clearly overridden any doctrinal differences between presumptive "schools" of psychology. This is clearly reflected in the similarity of developments in widely separated training units, developments that took place in all but complete isolation from knowledge of procedures in other training areas. The exhibit contains some suggestion that the common core of psychological knowledge and technique is more effective in meeting practical problems of human behavior than are the preachments of any particular point of view.

At most training activities the Aviation Psychologist spent much of his time as a student-counselor. Since he was dealing with a group of young men highly selected for physical and presumably mental health, it is not surprising to find that his problems closely paralleled those of the student-counselor at a typical university. The aviation cadet was confronted with a curriculum containing a wide variety of subjects. Especially during his pre-flight days, he presented the usual gamut of problems that arise when young men must learn from books, from lectures, and from demonstration. Here the psychologist felt thoroughly at home. When his suggestions were accepted, the recipient often had the astonishing experience of discovering that they really worked. This was hardly detrimental to the status of the "Student Advisory Officer"—a common designation for the local psychologist.

Success in dealing with problems of study-technique usually led to widened student-contacts, characteristically involving requests for aid in meeting personal problems. These tended to run through the usual catalog of the difficulties encountered by undergraduates. Families presented the types of problems that are always presented by families. A restriction against marriage during the duration of cadet-status brought up more acutely the emotional disturbances of post-adolescents facing an adult world. No small number of cadets concerned themselves with problems of postwar vocational placement or educational planning. Some merely wished to obtain attentive ears for their efforts to think through the meaning of a war which had received but little explanation in official circles. The psychologist faced here a local responsibility and a local opportunity of genuine social significance. Almost without exception, he faced it with the conviction that he was dealing with more than temporary problems or transient values.

In a system which affords an unusually high ratio of instructors to students, it is hardly surprising that the Naval Aviation Psychologist found himself frequently concerned with the student-instructor relationship. Only rarely were the instructors professional. Frequently the instructors themselves were recent graduates of the course they were now required to teach. Instructors' Schools had been established, but these ordinarily laid great stress on reviewing subject matter, with little if any attention to method of teaching. Thus the psychologist found himself confronted with a rich field for exploration. And again he made contributions which will last many years after the final cessation of hostilities.

As one example of an orderly approach to this problem, several independent attempts were made to develop workable rating-scales for flight instructors. These were viewed initially with a certain amount of suspicion. Once it had been demonstrated that these blanks were to be used as the basis for personal improvement, rather than for official disciplinary review, however, the way to acceptance was open. When standardization was finally made through central research and review, there was a steady procession of instructors through the office of the aviation psychologist. There they were given access to anonymous summary of the estimates placed upon them by their students. The psychologist stood ready to discuss the correction of weak point in terms of his accumulated experience. The records contain enough cases of successive improvements of ratings on specific issues to demonstrate that many instructors are willing to improve when made aware of their weaknesses and informed of avenues of improvement.

Not infrequently these contacts provided excellent opportunities for the discussion of problems in learning and training which lay outside the areas covered by the rating-scale. Often these contacts were greatly broadened by the fact that the psychologist offered himself as a guinea pig for flight-instruction. By serving as a flight-student himself (within the bounds of Navy legislation) the psychologist not only gained a closer liaison with the instructor, but he very greatly enhanced his knowledge of the training-materials with which he had to work. It may also be remarked that his appearance on the flight line in the humble status of student-pilot did not in any way diminish his acceptance at the hands of the aviation cadet.

It would be patently unfair to give credit to the aviation psychologist and not to mention the flight instructor. Typically the instructor was either a recent graduate of the training system or a civilian pilot converted by an abbreviated course into a Navy instructor. Tradition had it that his job was bore-

some to an extreme. He was warned ahead of time that he would grind out dull primary maneuvers in a "Yellow Peril" while his luckier fellows fought stirring duels with the enemy in fast and maneuverable military aircraft. He went more or less unrecognized, on and off the training base. Despite this negative setting, he was typically interested in his students, eager to train them properly, and amenable to suggestions when properly addressed. The psychologists in the field organization have been quick to come to his defense whenever they have detected any attempt to class all or most flight instructors as dull, unmotivated, and inherently resistant to change.

In the Instructors' Schools, the contribution of the psychologist followed predictable lines. Beginnings were humble—a lecture on principles of instruction, in which he was given a free hand. As he gained in experience, it was possible to illustrate his points by means of adequate and appropriate references to flight training, rather than to learning in general. The work was assigned increasingly larger proportions of the available time as it demonstrated its significance to those involved in wartime flight instruction. In at least two widely separated schools, the time assigned to the psychologist comprised the largest single area in the curriculum, by the time the war ended.

Locally constructed examinations become another concern of the psychologist. In the flight training program, the concept of centrally developed examinations was early put into force. Competent men were brought in directly from civilian agencies; and these men did a noteworthy job of bringing order into a heterogeneous and non-distributive examining system. In addition to such standardized examinations, however, there remained various local examination procedures. In many schools, accordingly, it fell to the aviation psychologist to demonstrate the practical significance of reliability, of range, and, upon occasion, of validity. It was ordinarily an absorbing procedure.

It is not possible, within the limits of this article, to review the wide variety of psychological duties which occupied these men at the end of the war. Due to the local autonomy which characterizes Navy activities, their accepted duties varied widely from place to place and from stage to stage of the training program. In the main they were concerned but little with selection, being mainly involved in problems of training and learning. In certain places this major concern led them over into detailed studies of local morale and of the factors determining local morale. In others it led over into improvement of local record-keeping to the end that records should be sign posts pointing toward improvement in procedure rather than epitaphs on the graves of defunct ways of doing. At its very best, the attack on training finally made the local aviation psychologist the technical adviser on training methods with direct access to those responsible for the local administration of a training program.

In sum, psychologists who were first brought in with the vaguely formulated idea that they could help with selection "and other things" had, by the end of the war, demonstrated that they have a place of practical importance in the administration of a program for training flight-personnel. They have done so in circumstances which gave them maximum local opportunity with minimum central direction. Except in rare instances, they have had to work on their own initiative and on their own responsibility. The present placement and labelling of these officers supplies the best measure of the extent to which they have justified the best efforts of the civilian graduate groups which gave them their peacetime professional training.

It will not detract from the record of psychologists in wartime to state that the high level of performance of civilians-in-uniform has made a lasting im-

pression on the Navy. The bankers who became shotgun instructors took their work seriously and, in the vast majority of cases, did their level best to turn out good aircraft gunners. The English professors who were transformed into Air Combat Intelligence Officers performed faithfully and well under heavy strain. Officers in the permanent naval organization have been genuine and sincere in their repeated public statements in praise of the way in which the vast bulk of Reserve Officers have accepted discipline and carried on in novel assignments with good spirits and high effectiveness. It is good to report that the profession of psychology has not suffered by comparison with the performance of other essentially non-military groups.

Since the group described in this article was definitely a service organization rather than a research organization, the reader may well ask what has come out of it all, now that the war is over. Well, at the very least, a conviction on the part of the permanent naval organization that the aviation psychologist has a regular and significant place in Naval aviation training. This is attested by the arrangements now being made in the Bureau of Medicine and Surgery to establish a permanent program in Aviation Psychology—a development unthought of, five years ago.

More important, perhaps, has been the growth within the Naval organization of a widespread awareness that the psychologist has specific techniques, peculiar to his own profession, which have proved of value in meeting practical problems in flight training. In concrete form these are reflected in residual changes in the flight training syllabus and in the procedures by which the syllabus is implemented. True enough, some of these changes will undoubtedly be lost through later administrative changes. A large operation, involving thousands of men, does not readily accept change nor readily retain it. Not even the most pessimistic observer would, however, be inclined to deny that the residual changes are sufficient to afford a solid basis for later developments.

It would be quite fair to all concerned to say that the good fight has only begun. Unless our profession loses contact with the Navy during the peace ahead, it will not again be necessary to demonstrate that psychologists can contribute significantly to the effectiveness of flight training. The energies hitherto devoted to that necessary step may now be diverted to the broader task of demonstrating the soundness of specific changes in flight training procedure which research-minded psychology would recommend. The field service organization described in this article has made a splendid beginning. Full realization of the possibilities ahead can be achieved only through the integrated efforts of the profession as a whole.

PSYCHOLOGICAL TEST CONSTRUCTION AND RESEARCH IN THE BUREAU OF NAVAL PERSONNEL:

VALIDITY OF THE BASIC TEST BATTERY, FORM 1, FOR SELECTION FOR TEN TYPES OF ELEMENTARY NAVAL TRAINING SCHOOLS¹

STAFF OF THE TEST AND RESEARCH SECTION

*Training, Standards and Curriculum Division,
Bureau of Naval Personnel*

The United States Navy Basic Test Battery was developed for use in the selection of enlisted personnel for assignment to naval training schools where they would be taught to perform such specialized technical Navy jobs as the operation of radar equipment, the upkeep and repair of Diesel engines, or the handling of the fire control apparatus on ship's guns. A previous article described the development of the tests of the battery and reported the results of a number of special statistical analyses: test reliabilities, intercorrelational studies, factor analyses.

Since the first form of the Basic Test Battery was placed in operation in June 1943, a continuing program of validation studies has been carried on to insure that the tests are used as effectively as possible. From the beginning, data have been accumulated on the validity of tests of the battery in predicting success in both elementary and advanced naval training schools for enlisted personnel, relating test scores to such criteria of school success as ratings on achievement, grades in individual courses, final school grades, rank in class, and success or failure. Validity coefficients have been determined for over 20 elementary and 18 advanced types of schools, including an over-all total of 350 or more classes. In addition to the routine determination of validity coefficients for these schools, a number of special research projects on the Basic Test Battery have been completed. The study summarized here was designed to determine the validity of the original tests of the battery, alone and in combination, in predicting success in ten types of elementary schools. Other studies will be reported in subsequent articles.

Tests studied. The tests used in this study included Form 1 of each of the following: General Classification Test; Reading Test; Arithmetical Reasoning Test; Mechanical Aptitude Test; and Mechanical Knowledge Test, using both Mechanical and Electrical scores. These tests have been described in the article referred to above.

Populations studied. The subjects of the study were trainees in ten types of elementary naval training schools for enlisted personnel. The distribution of these trainees in the various types of schools is shown in Table I. The data represent all graduates in classes for which data were available.

Criterion of school success. Final school grades, expressed in percentages, were used as the criterion of school success.

¹ This article is the third of a series of reports describing the work of the Test and Research Section and the second report on the Navy Basic Test Battery. Psychological Testing and Research in the Bureau of Naval Personnel: Work of the Navy's Test and Research Section. *Psychol. Bull.*, 1945, 42, 433-444. Psychological Test Construction and Research in the Bureau of Naval Personnel: Development of the Basic Test Battery for Enlisted Personnel. *Psychol. Bull.* 1945, 42, 561-571.

TABLE I
ESTIMATED COEFFICIENTS OF CORRELATION* BETWEEN SCORES ON TESTS OF THE BASIC BATTERY, FORM 1, AND FINAL GRADES IN TEN TYPES OF
ELEMENTARY NAVAL TRAINING SCHOOLS FOR AN UNSELECTED NAVY RECRUIT POPULATION

Type of Naval Training School	Number of Graduating Classes	Number of Cases	TESTS				
			General Classi- fication	Reading	Arith- metical Reasoning	Mechanical Aptitude	Mechanical Knowledge Mech. Score Elect. Score
Basic Engineering	8	1480	.52	.52	.63	.52	.46 .39
Diesel	9	2160	.42	.35	.36	.26	.43 .46
Electrical	12	1747	.52	.52	.59	.44	.35 .49
Gunner's Mates	12	1677	.38	.39	.31	.28	.40 .43
Machinist's Mates	5	755	.33	.27	.44	.48	.48 .46
Radar Operators	4	1053	.60	.67	.61	.50	.35 .38
Signal	8	984	.49	.43	.44	.25	.13 .13
Sotreckeepers (WR)	4	678	.44	.47	.59	.37	† .†
Torpedo	7	880	.32	.35	.28	.27	.39 .35
Yeomen (WR)	2	738	.62	.59	.63	.38	† .†

* Correction for restriction in range of test scores resulted in an average increase in the magnitude of the correlations of .09.

† Test not given to personnel in the Women's Reserve.

Procedures. During recruit training, the tests of the battery are administered to each recruit. On the basis of test scores and other factors, the decision is made as to whether or not he should be recommended for assignment to a naval training school. It has been common practice to use "cutting scores" on one or more tests for selection for each type of school. These "cutting scores" are based on studies of the relation between test scores and final school grades (or some other criterion of success) in specific types of schools and are subjected to continuing evaluation and revision.

In this study two types of correlational analysis were made to determine the relationship between test scores and grades: (1) Correlation coefficients were determined between trainees' scores on a single test and their final grades. (2) Correlation coefficients were determined between trainees' final grades and scores on a combination of two tests.

Analysis of data. Product-moment coefficients of correlation were calculated between scores on each test and final grades for each class separately in each of the types of schools studied.² Because of the variation which appeared from time to time in selection and training procedures, and in the bases for assigning final grades, these coefficients were not directly comparable either from class to class within schools or between schools. Furthermore, the obtained coefficients were attenuated by the restriction in range resulting from the use of the selection procedures and from elimination of failures. Therefore they would not be indicative of the effectiveness of the tests when used with the total or unselected population.

In order to secure a coefficient for each test that would be more nearly (1) comparable from school to school and from class to class within schools, and (2) representative of the correlation secured from an unselected population, two statistical procedures were used. First, the corrections for restricted range were made by using Kelley's formula.³ The standard deviation of the unrestricted recruit population is equal to 10. The estimated coefficients obtained from the use of this formula could, under the assumptions given by Kelley, now be compared directly. Second, because a distribution of estimated coefficients was available for each test, an average value was computed to permit the convenient summarization of these statistics. The z transformation⁴ was used and the average value converted to r . This r , termed the estimated correlation coefficient or the single-test validity coefficient, was used as representative of the correlation coefficient that would be determined in an unselected population in each type of school for each test with final grades. Table I presents these correlation coefficients. Through comparing them, it is possible to identify the test which

² These correlation coefficients were supplied through the cooperation of a Project of the National Defense Research Committee.

³ Kelley, Truman L. *Statistical Method*. Macmillan, 1923.

$$r \text{ (estimated)} = \frac{r}{\sqrt{\frac{\sigma^2}{\Sigma^2} - r^2 \frac{\sigma^2}{\Sigma^2} + r^2}}$$

Where r = obtained coefficient of correlation

σ = the standard deviation of the test in the restricted population

Σ = (ten), the standard deviation of the test in the unrestricted population.

⁴ Peters, C. C. and Van Voorhis, W. R. *Statistical Procedures and their Mathematical Bases*. New York: McGraw-Hill, 1940.

TABLE II
VALIDITY COEFFICIENTS FOR THE BASIC TEST BATTERY IN TEN TYPES OF ELEMENTARY NAVAL TRAINING SCHOOLS

Type of Naval Training School	Highest Validity Coefficient for a Single Test	Combination of Two Tests	Highest Validity Coefficient for Combination of Two Tests	r Based on Summed Scores
Basic Engineering	Arithmetical Reasoning	Arithmetical Reasoning & Mechanical Knowledge (M)	.63	.63
Diesel	Mechanical Knowledge (E)*	General Classification & Mechanical Knowledge (E)	.46	.51
Electrical	Arithmetical Reasoning	Arithmetical Reasoning & Mechanical Knowledge (E)	.59	.63
Gunner's Mates	Mechanical Knowledge (E)	Reading & Mechanical Knowledge (E)	.43	.47
Machinist's Mates	Mechanical Aptitude or Mechanical Knowledge (M)†	Mechanical Aptitude & Mechanical Knowledge (E)	.48	.53
Radar Operators	Reading	Reading & Arithmetical Reasoning	.67	.70
Signal	General Classification	General Classification & Arithmetical Reasoning	.49	.50
Storekeepers (WR)	Arithmetical Reasoning	Reading & Arithmetical Reasoning	.59	.58
Torpedo	Mechanical Knowledge (M)	Reading & Mechanical Knowledge (M)	.39	.43
Yeomen (WR)	Arithmetical Reasoning	General Classification & Arithmetical Reasoning	.63	.67

* (E) represents Electrical Score on the Mechanical Knowledge Test.

† (M) represents Mechanical Score on the Mechanical Knowledge Test.

may be termed the "highest single predictor" of school success for each type of school.

Because some combinations of scores on two or more tests can be expected to be more effective in predicting success than scores on a single test, multiple correlations were computed (using the estimated correlation coefficients) for combinations of scores on two tests with the criterion of final grades. The question of convenience of use in the classification centers limited the consideration to combinations of two tests.

The convenience of simply adding the test scores led further to the investigation of the magnitude of the correlation coefficients between the sums of the test scores for two tests and final grades. These correlations also were computed from the estimated correlation coefficients with the standard deviations equal to that for an unselected recruit population (ten).⁵ The correlations between sums of test scores and final grades were called validity coefficients based on summed scores. Table II shows for each school the highest single-test validity coefficient, the multiple correlation coefficients, and the highest validity coefficients as they were computed from the estimated correlation coefficients.

Findings. Table I presents the estimated correlation coefficients between single test scores and final school grades in the 10 types of schools. From the data in this table it is apparent that:

1. A varying but substantial degree of relationship exists between recruit performance on tests of the Basic Test Battery and subsequent success in certain types of elementary naval training schools for enlisted personnel. In general, the best test for each type of school correlates about .53 with school grades, the second-best test about .48, and the third-best test about .46.

2. The predictive efficiency of the *battery* of tests varies by schools. The highest validity coefficient among the ten types of schools is .67 between Reading Test scores and grades in Radar Operator schools. At the other extreme, the highest validity coefficient for Torpedo schools is .39 between final school grades and scores on the Mechanical part of the Mechanical Knowledge Test.

3. The predictive efficiency of *each* test varies by schools; for example, the single-test validity coefficients of the General Classification Test range from .33 with final school grades in Machinist's Mates schools to .62 with final grades in Yeomen schools.

4. Each of the tests studied, with the exception of the Mechanical Aptitude Test, has the highest estimated correlation coefficient in at least one type of school. Statistical analyses of the significance of the difference between the estimated correlation coefficients were not made. The tests, together with the schools for which they appear to be the most effective predictors, are listed below:

General Classification Test: Basic Engineering and Signal schools.

Reading Test: Gunner's Mates and Radar Operators schools.

Arithmetical Reasoning Test: Electrical, Storekeepers, and Yeomen schools.

Mechanical Knowledge Test (Mechanical Score): Torpedo schools.

Mechanical Knowledge Test (Electrical Score): Diesel schools.

Mechanical Aptitude Test and Mechanical Knowledge Test (Mechanical Score): Machinist's Mates schools.

⁵ The formula used

$$r(a+b)x = \frac{r_a x + r_b b}{\sqrt{2(1+r_{ab})}}$$

x = final grade

a, b = test scores

The validity coefficients shown in Table I are high enough to indicate that at successively higher levels of scores on tests, consistently higher percentages of examinees would make average or better final school grades. Percentage graphs were prepared to demonstrate graphically this relationship for each of the three tests most highly correlated with school grades in each type of school. Figure 1, which is representative of these graphs, shows for the Diesel schools the actual percentages of trainees at various General Classification Test score levels who made average or better final grades, together with the theoretical

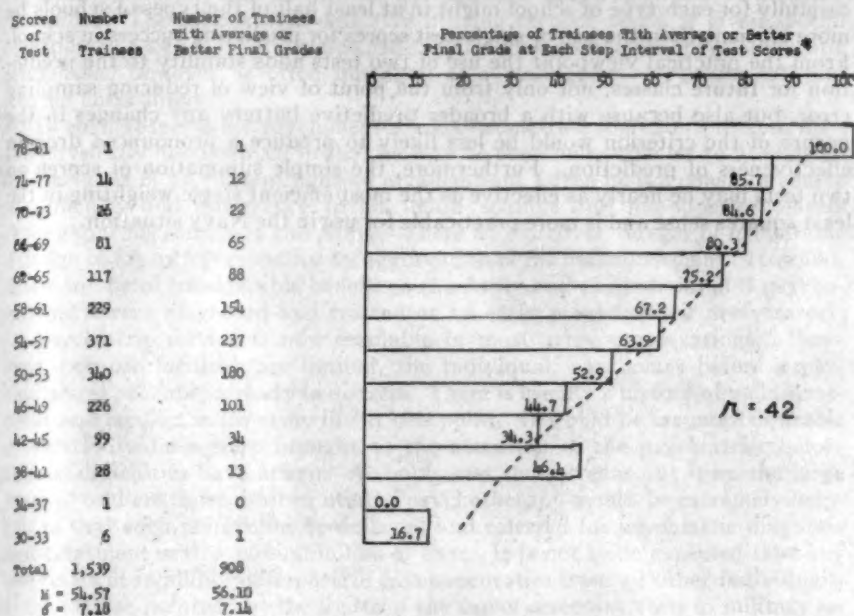


FIGURE 1. PREDICTIVE EFFICIENCY OF THE GENERAL CLASSIFICATION TEST, FORM 1, IN DIESEL SCHOOLS.

* Observed percentages are indicated by bars, theoretical percentages by broken line.

percentages computed from the validity coefficient. It is evident from examination of Figure 1 that the actual and theoretical percentages correspond closely, and that there is a steady increase at each higher level of General Classification Test score in the percentage of trainees with average or better final grades.

Table II presents for each of ten types of schools the highest validity coefficients for single tests and for combination of two tests. Both the multiple correlation coefficients and the validity coefficients based upon sums of scores for the same combination of tests and final grades are shown. From examination of this table it may be seen that with one exception the observed values of the validity coefficients based on sums of scores are slightly higher than the values of the single-test validity coefficients and that they approximate the values of the multiple correlation coefficients. No tests of the significance of the differences were made because in view of the assumptions involved they were not considered determinable. However, the consistent increase in the value of the

correlation coefficients with the use of two tests would suggest that the use of a second test adds to the effectiveness of prediction.

Discussion. The findings reported in the previous section support the use of Basic Test Battery scores in determining which enlisted personnel should be recommended for the types of specialized schools under consideration in this study. Any one of the tests of the battery would be of value in predicting success in some of the types of schools, and the use of the entire battery aids considerably in improving the selection procedures.

The findings suggest also that the use of cutting scores on two tests selected carefully for each type of school might in at least half of the types of schools be more efficient than the use of single test scores for predicting success in school. From the practical viewpoint the use of two tests adds stability to the prediction for future classes, not only from the point of view of reducing sampling error, but also because with a broader predictive battery any changes in the nature of the criterion would be less likely to produce a pronounced drop in effectiveness of prediction. Furthermore, the simple summation of scores on two tests may be nearly as effective as the most efficient single weighting in the least squares sense and is more practicable for use in the Navy situation.

DETECTING PSYCHONEUROTIC TENDENCIES IN ARMY PERSONNEL*

HOWARD E. PAGE, MAJOR, AGD

*Classification and Replacement Branch, Adjutant General's Office,
Washington, D. C.*

That psychoneurotics may be as unfit for military service as persons suffering from purely physical limitations has not been fully recognized by all army personnel. The soldier with defective hearing or poor vision is given special consideration as a matter of course; the soldier with pronounced psychoneurotic tendencies, however, is often mistaken as a malingerer or "goldbrick" and treated accordingly.

In some respects the psychoneurotic may constitute a greater problem than the physically handicapped in that he may be even more difficult to fit in as an integral part of an efficient fighting organization. Often he is a constant source of difficulty and annoyance to his fellow soldiers and his superior officers throughout his service in the Army. There is, moreover, danger of irreparable damage to his own personality by aggravation of his maladjustment. It would, therefore, be of considerable benefit to the Army and the individual if psychoneurotics were diagnosed and treated at an early point in their army career.

Psychiatric service is now available in most army organizations. However, because facilities are limited, the individual who comes before a psychiatrist is probably already in distress. There is usually a history of maladjustment and conflict in his army life at this point. It would be far more desirable if such individuals were brought to the attention of the psychiatrist before serious difficulties have arisen. A simple test that screens out from the large mass of soldiers those most in need of psychotherapy would be extremely helpful, in that such men could be detected and referred for psychiatric diagnosis and treatment with a minimum loss of time. It is not to be expected that any one test will infallibly differentiate psychoneurotics from all other individuals. Hunt (3) has pointed out the limits of the use of screening tests in military selection. It may be expected, however, that a test can be prepared which will pick out from a group the majority of psychoneurotics and eliminate from further consideration all but a few of those not seriously in need of psychiatric consultation. It is the description of the development of such a test that is the primary purpose of this study.

There are available and in general use by psychologists a number of tests designed to measure psychoneurotic tendencies. It was decided that the effectiveness and practicability of certain of these tests to measure psychoneurotic tendencies in the Army should first be investigated. Then, depending on the results of the investigation, one of the tests would be selected for use, or a new test prepared.

In selecting tests of psychoneurotic tendencies to determine their utility in detecting psychoneurotics in the Army, there are several factors to consider in addition to the effectiveness they have displayed with civilian populations. It is necessary that the tests be suitable for administration to large groups; that they be comprehensible to and answered by even the duller members of

* The following article represents the opinion of the author only and is not to be construed as representing the official opinion of the War Department or the Army of the United States.

an average group; that they not require much time to give; and, that they be quickly and easily scored.

Such factors as just enumerated are often lacking in tests generally in use. They are often standardized on groups of high educational level with the result that the vocabulary is beyond the reach of many. Furthermore, in the normal setting for the administration of such tests time required for scoring and the ease with which such scoring may be accomplished are factors of little importance. In the military situation, however, these factors are paramount.

A survey of the personality tests immediately available indicated that the BI-N scale of the "Personality Inventory" by R. G. Bernreuter (2) and the "Psychosomatic Inventory" by R. A. McFarland and C. P. Seitz (5), while not ideal from the point of ease in interpretation and scoring, held promise of meeting the requirements of this study.

The Personality Inventory consists of 125 questions such as "Do you day-dream frequently?" and "Do you often feel just miserable?" The subject answers "Yes," "No," or "?" for each question. Each response is assigned a weight by Bernreuter proportional to the degree to which that response indicates psychoneurotic behavior. The total score is the sum of the individual weights for an adult male population.

The Psychosomatic Inventory is similar to the Personality Inventory in principle and scoring. However, it is divided into two parts of forty-six questions each. Part I emphasizes hypochondriacal aspects of psychoneurosis; Part II, anxiety aspects. On this test the subject answers either "Often," "At times," "Seldom," or "Never" to the questions. Norms are available for converting the raw score on each part as well as the total raw score to percentile scores.

In order to determine how effective the Psychosomatic Inventory and the Personality Inventory are in predicting psychoneurotic tendencies in Army personnel, it was first necessary to set up an accepted standard for measuring such tendencies with which results on the tests could be compared. The diagnoses of the neuropsychiatrists attached to the ASF Regional Hospital, Camp Lee, Virginia, and the ASFTC Consultation Service, Camp Lee, Virginia, were chosen as the criteria. Strict accord with theoretical principles would require that diagnoses be obtained on a typical cross-section of the Army population received here for training and these be compared with the test results of the same group. However, this procedure would have required the neuropsychiatrists to spend considerable time in observing and diagnosing many soldiers not in need of psychiatric treatment. Since the limited personnel and the pressure of regular work made the diagnoses of stable individuals unfeasible, a somewhat less satisfactory method for validating the tests was employed.

The procedure used consisted essentially of comparing the test scores of matched groups of 100 diagnosed psychoneurotic trainees with 100 undiagnosed trainees. The soldiers in the latter group had never appeared before any neuropsychiatrist at Camp Lee, and, so far as could be determined, had made a normal adjustment to military life. It is possible, however, that the undiagnosed group did possess individuals with tendencies toward instability. However, the inclusion of such individuals in the undiagnosed group would tend to lower the apparent ability of the tests to differentiate true psychoneurotics from other individuals. Any error introduced by such inclusion could produce results which erred only in being too conservative an indication of the effectiveness of these tests.

The Personality Inventory and the Psychosomatic Inventory were first administered to one hundred soldiers who had been diagnosed as psychoneurotic by the Neuropsychiatric Services at Camp Lee, Virginia. All of these men were in a trainee status at the time of diagnosis and testing.

DETECTING PSYCHONEUROTIC TENDENCIES ARMY PERSONNEL 647

A second group of one hundred men was selected from the trainees at the ASFTC. Since it was impossible at this point to ascertain what effect the age, intelligence, length of Army service, and section of the United States from which an individual came would have on his scores on the Personality Inventory and the Psychosomatic Inventory, it was felt that the group of undiagnosed trainees should be matched on these factors with the diagnosed psychoneurotics. Then differences found in the results of the groups on the two tests could not be attributed to these extraneous factors. The two groups were accordingly equated on these factors. The data showing their equivalence on these items is presented in Table I.

TABLE I

EQUIVALENCE OF CRITERION GROUPS: COMPARISON ON VARIOUS FACTORS OF 100 PSYCHONEUROTIC AND 100 UNDIAGNOSED SOLDIERS IN A TRAINEE STATUS AT ASFTC., CAMP LEE, VIRGINIA

A. Chronological Age

	Number	Range	Median	Q ₁	Q ₃	Mean	S D
Psychoneurotics	100	18-44	27.2	23.5	33.0	28.8	6.77
Undiagnosed	100	18-44	27.2	24.1	34.0	28.6	6.54
Difference			0			0.2	0.24
Critical Ratio			0			0.02	0.36

B. Army General Classification Test Score

Psychoneurotics	100	42-149	91.0	73.1	105.0	90.70	23.65
Undiagnosed	100	42-143	86.0	67.2	103.3	91.90	24.80
Difference			5.0			-1.20	-1.15
Critical Ratio			1.17			0.35	0.47

C. Length of Service (In days)

Psychoneurotics	100	19-236	75.4	49.2	115.0	87.7	45.8
Undiagnosed	100	9-228	71.8	55.3	91.3	81.5	42.4
Difference			3.6			6.2	3.4
Critical Ratio			0.46			0.99	0.77

D. Service Command of Induction

	1	2	3	4	5	6	7	8	9	Total
Psychoneurotics	18	30	20	11	12	5	2	2	0	100
Undiagnosed	17	30	23	12	6	6	3	3	0	100

In Part A of Table I are given the range of ages, median and quartile ages, the mean age, and the standard deviation of the ages of the group of one hundred diagnosed psychoneurotics and of one hundred undiagnosed trainees. Inspection of these values reveals that the range and median ages of the two groups are identical, and that the means and standard deviation differ very little. The small critical ratio for these last two measures show these differences to have no statistical significance. Accordingly, the two groups may be considered to be matched in respect to age.

In Part B of Table I are found the statistical data on the Army General Classification Test scores for the two groups. It can be seen that the mean value and standard deviation of test scores for the undiagnosed group differs from those for the diagnosed psychoneurotic group by only 1.20 and 1.15 points, respectively. These differences are shown to have no statistical significance by their corresponding critical ratios of 0.35

and 0.47. A somewhat larger difference of 5.0 points exists between the median test scores of the two groups. However, this value, too, is not large enough to be of statistical significance.

Part C contains a comparison of the length of service of the groups. For the purpose of this study, the length of service was defined as the number of days from the date of induction to the date of testing. It can be seen that the psychoneurotic group had been in the Army an average of 6.2 days longer than the undiagnosed group. This difference is shown to be statistically not significant by the critical ratio of 0.99. It can also be seen that no significant differences exist between the standard deviations or median of the length of service of each group.

The number of trainees inducted from each service command is shown for both groups in part D of Table I. Inspection of the Table reveals that, in general, the numbers furnished the two groups by each service command are equal.

From the above it is apparent that on the factors of age, intelligence as measured by Army General Classification Test, length of army service prior to being tested, and section of the country from which they came, the groups of psychoneurotic and undiagnosed individuals are equivalent. It may be assumed, therefore, that any differences found in the performances of the groups on the Psychosomatic Inventory and the Personality Inventory are not the result of differences in these factors.

The Bernreuter Personality Inventory and the Psychosomatic Inventory were next administered to the one hundred undiagnosed trainees. The means, standard deviations, medians and quartile values of the scores made by the one hundred psychoneurotics and the one hundred undiagnosed trainees on Part I, Part II, and the total of the Psychosomatic Inventory, and on the Personality Inventory were computed and are listed in Table II. For these computations percentile scores were used with the higher percentiles indicating the greater degrees of psychoneurotic tendencies.

Part A of Table II contains the results for the total score on the Psychosomatic Inventory. It will be seen that the diagnosed psychoneurotics had a mean score of 93.80, while the mean score of the non-diagnosed group was 61.76. The critical ratio of 10.97 found for the difference between these means indicates that there is almost no possibility that the large difference found was the result of chance. The standard deviations for the psychoneurotics and the undiagnosed group of 10.21 and 27.32 respectively, show that the scores for the first group are much more compactly grouped around the mean than are the scores of the second. Inspection of the quartile points shows that 75 per cent of the psychoneurotics score at the 94.6 percentile or *higher*, while 75 per cent of the undiagnosed group fall at the 89.3 percentile or *lower*.

Study of Parts B and C of the Table, which contain the data for Parts I and II, respectively, of the Psychosomatic Inventory, reveals that each section of the test produces results wholly comparable with those for the entire test. It will be seen that on both parts the mean scores of the psychoneurotics are higher than the corresponding mean scores of the undiagnosed soldiers by amounts that are statistically significant; the scores of the psychoneurotics are more compactly grouped than are those of the undiagnosed group as shown by the smaller standard deviations and the smaller quartile deviations for the psychoneurotic group; and the first quartile points for the psychoneurotics are higher than the third quartile points for the undiagnosed group.

In Part D of Table II are given the results of the two groups on the Bernreuter Personality Inventory. Inspection reveals that the mean score of the psychoneurotics is 79.21, or about twice as great as the mean score of 39.49 obtained by the undiagnosed trainees. The difference of 39.72 between these means is shown to be statistically significant.

cant by the critical ratio of 9.11. The standard deviations may be seen to be 28.47 and 33.08 for the psychoneurotic and undiagnosed groups, respectively. The difference of 4.61 is not statistically significant as shown by the critical ratio of 1.50. Examination of the quartile points discloses that 75 per cent of the psychoneurotics score 70 or above, whereas 75 per cent of the undiagnosed soldiers score 69 or less.

In general, the following conclusions may be drawn from Table II. The psychoneurotic group scores significantly higher than the undiagnosed group

TABLE II

COMPARISON OF SCORES OF 100 PSYCHONEUROTIC AND 100 UNDIAGNOSED SOLDIERS ON THE PSYCHOSOMATIC INVENTORY AND THE PERSONALITY INVENTORY

A. Psychosomatic Inventory—Total

	Num- ber	Range	Median	Q_1	Q_3	Q	Mean	S D
Psychoneurotic	100	30-99	97.7	99.2	94.6	2.30	93.80	10.21
Undiagnosed	100	1-99	65.5	89.3	39.3	25.00	61.76	27.32
Difference			32.2				32.04	-17.11
Critical Ratio			8.80				10.97	8.31

B. Psychosomatic Inventory—Part I

Psychoneurotic	100	44-99	98.3	99.1	96.8	1.15	95.46	8.52
Undiagnosed	100	4-99	70.5	92.2	43.0	24.60	65.65	26.20
Difference			27.8				29.71	-17.68
Critical Ratio			8.03				10.76	9.07

C. Psychosomatic Inventory—Part II

Psychoneurotic	100	15-99	95.6	98.1	81.0	8.55	87.49	16.21
Undiagnosed	100	3-99	60.3	80.3	33.5	23.40	56.88	27.21
Difference			35.5				30.61	-11.00
Critical Ratio			8.89				9.66	4.91

D. Bernreuter Personality Inventory (BI-N Scale)

Psychoneurotic	100	2-99	94.5	99.2	70.0	14.60	79.21	28.47
Undiagnosed	100	1-99	27.5	69.0	10.0	29.50	39.49	33.08
Difference			67.0				39.72	-4.61
Critical Ratio			12.27				9.11	1.50

on the Bernreuter Personality Inventory and on the whole and the parts of the Psychosomatic Inventory. On the Psychosomatic Inventory the psychoneurotics obtain scores which are very closely grouped at the upper end of the scale. It may be noted that the median of the undiagnosed trainees for the Psychosomatic Inventory is 65.5 or 15.5 points above the median of 50 that one might expect with a sample similar to the standardizing group. The median of the undiagnosed group on the Personality Inventory, on the other hand, is 27.5 or 22.5 points below the median of Bernreuter's standardization group. These results indicate that a representative sample of trainees at the ASFTC may differ sufficiently from any group used in the standardization of available tests of psychoneurotic tendencies to necessitate the computation of new norms for such army personnel. A comparison of Parts B and C of the Table

shows that the scores obtained on Part I of the Psychosomatic are for each group higher than the scores obtained by the same group on Part II. It may be that army life has emphasized the physical aspects of maladjustment, such as hypochondriasis and conversion hysteria, more than the purely mental aspects for these samples of trainees.

As a further means of determining the validity of the Inventories as measures of psychoneurotic tendencies, biserial coefficients of correlation were computed using scores on each scale as the continuous series and diagnosed psychoneurotic—undiagnosed trainee as the dichotomous classification. It is to be pointed out that the statistical use of biserial coefficients of correlation in this situation is not for the purpose of the development of regression equations, but rather is used as a method to amplify the techniques of statistical significance. The results of these calculations may be found in Table III. Inspection of the Table disclosed that the scales all have a high relationship with the diagnoses of the neuropsychiatrists, varying from .71 for Part II of the Psychosomatic Inventory to .80 for the total of the Psychosomatic Inventory. It should be noted that the validity coefficient for Part I and for the total of the Psychosomatic Inventory are practically identical. Thus the addition of the 46 questions of Part II to the 46 questions of Part I does not appear to increase the validity of Part I.

TABLE III

BISERIAL CORRELATION FOR PERSONALITY INVENTORY SCORES WITH PSYCHONEUROTIC UNDIAGNOSED CATEGORIES, BASED ON 100 PSYCHONEUROTIC SOLDIERS AND 100 UNDIAGNOSED SOLDIERS

Test	r_{bs}	P. E.
Bernreuter BI-N	.75	.03
Total Psychosomatic	.80	.03
Part I Psychosomatic	.79	.03
Part II Psychosomatic	.71	.04

In order to determine to what degree the factors measured by each scale were related, the coefficients of correlation between the Personality Inventory and the Psychosomatic Inventory and its parts were calculated and are presented in Table IV. Inspection of the Table shows that the Personality Inventory has a substantial relationship to the parts and total scales of the Psychosomatic Inventory, the coefficients of correlations between these scales ranging from .57 to .63. Parts I and II also have a marked relationship as shown by the coefficient of correlation of .57 between these measures. The high coefficients

TABLE IV

INTERRELATIONSHIPS OF PERSONALITY INVENTORY AND TOTAL SCORE, PART I, AND PART II OF THE PSYCHOSOMATIC INVENTORY

	PS-I	PS-II	PS-T
BI-N	.57	.60	.63
PS-I		.57	.87
PS-II			.84

of correlation between the parts and the total of the Psychosomatic Inventory are, of course, not too meaningful, since each part constitutes half of the total and, therefore, the computations involve the spurious element of, in part, correlating a test against itself.

The relationships between psychoneurotic tendencies, as measured by the Psychosomatic Inventory and Personality Inventory scales, were correlated against the factors of Army General Classification Test Score, age, and length of service for the 100 undiagnosed trainees. The results of these computations are listed in Table V.

TABLE V

RELATIONSHIP OF SCORES ON THE PERSONALITY INVENTORY AND ON THE TOTAL SCALE, PART I, AND PART II OF THE PSYCHOSOMATIC INVENTORY TO AGCT SCORES, AGE, AND LENGTH OF SERVICE

	AGCT		Age		Length of Service	
	r	P. E.	r	P. E.	r	P. E.
BI-N	-.12	.07	.14	.07	-.14	.07
PS-I	.04	.07	.12	.07	-.15	.07
PS-II	.10	.07	.30	.06	-.24	.06
PS-T	.04	.07	.26	.06	-.19	.07

Examination of the second column discloses that scores on the Army General Classification Test have a negligible relationship with the four psychoneurotic scales, the coefficients of correlation varying from +.10 to -.12. In each instance the coefficient of correlation is considerably less than four times the probable error. Accordingly, it may be concluded that psychoneurotic tendencies as measured by the Psychosomatic Inventory and the Personality Inventory, have no relationship of statistical significance with intelligence as measured by the Army General Classification Test.

The coefficients of correlation between age and psychoneurotic tendencies as measured by the tests are listed in the fourth column of Table V. A small positive relationship between increasing age and increasing psychoneurotic tendencies may be noted. However, it will be seen that the probable errors are relatively large in comparison with their corresponding coefficients of correlation. As a result, it may be assumed that little or no relationship exists between age and psychoneurotic tendencies.

In the last two columns of Table V are given the coefficients of correlation and their corresponding probable errors for the relationships between the length of service and scores on the four scales of psychoneurotic tendencies. It is readily seen that the coefficients of correlation are in each instance less than four times the value of their corresponding probable errors. The slight negative relationships between psychoneurotic behavior and length of service shown by the coefficients of correlation are not, therefore, statistically reliable.

In summary, it may be stated that the coefficients of correlations between psychoneurotic tendencies, as measured by the Personality Inventory and the Psychosomatic Inventory, and the factors of intelligence, age, and length of service are so small, in comparison with their probable errors, that statistically they cannot be considered to be indicative of any definite relationship.

The results listed and discussed in the preceding section lead to the conclusion that both the Psychosomatic Inventory and the Personality Inventory are fairly effective instruments for the initial sorting of psychoneurotic individuals from large groups. The statistical data presented, however, fails to disclose several difficulties encountered in their use with Army personnel. These were as follows: First, each test required more time to administer than could be easily included in the training program schedule; secondly, scoring of

any considerable number of tests was a lengthy task; thirdly, several items in each test, e.g., "Does your ambition need occasional stimulation through contact with successful people?", occasioned many questions as to their meaning and, as a result, increased the difficulties of administering the tests; and, fourthly, many individuals, particularly those who had difficulty understanding the questions, had to be continuously urged to omit no items and to consider each one carefully before answering.

It was noted in the discussion of the results that Part I of the Psychosomatic Inventory was more effective in differentiating psychoneurotics than was the total Inventory. Apparently, the effect of adding the items in Part II to those in Part I is to decrease rather than increase the validity of the scale. Conversely, it was seen that Part II in itself was a fairly valid scale of psychoneurotic tendencies. From these results, it may be surmised that those items in Part II which are effective measures of psychoneurotic tendencies relate to aspects of psychoneurosis which are also well covered by items in Part I, and further, that Part II contains a number of items which add little to the effectiveness of the scale. If these assumptions are correct, combining Part II with Part I, will, on the one hand, result in no increase in the factors of psychoneurosis that will be measured, and, on the other hand, will introduce a number of items, which, since they do not differentiate psychoneurotics from stable individuals, will tend to decrease the differences in score between groups of such individuals. Thus, the net effect would be to decrease the validity of Part I by the addition of Part II.

It is apparent from the above that the number of items in the particular scales used in this study are by no means an indication of their effectiveness. Altus and Bell (1) have indicated that a short scale may give as reliable results in the measure of maladjustment as scales consisting of more numerous items.

It is reasonable to assume that by proper selection of those items which appear to be the more valid measures of psychoneurotic tendencies a short test could be prepared which would lose little in the way of reliability or validity. Wallin (6) indicates the military need for such tests and further indicates their value for non-military uses as well. On this basis, an attempt has been made to develop such an inventory of psychoneurotic tendencies.

In the preparation of this inventory it was deemed advisable to use items occurring in the scales already used in the preliminary work. No attempt was made to originate new items.

In order to select the best items from each scale for use in preparing a new inventory an item analysis was made of the answers given by the criterion groups on the Psychosomatic Inventory and the Personality Inventory. Although the percentages of each group making specific responses to the various items are indicative of the validity of the items as measures of psychoneurotic tendencies, they are not easily compared to determine which items are most effective. A formula developed by T. L. Kelley (4) for assigning weights to responses in proportion to their ability to differentiate between two groups or characteristics furnishes a method for analyzing the percentages. This method was used and only those items producing a maximum difference on the Kelley weighting scale were considered. Two other criteria were also used in the final selection of items. Where two or more items equivalent on the Kelley weighting scale covered almost wholly the same aspect of psychoneurotic tendencies only one was included in the scale. Finally those items which had shown themselves to be difficult of interpretation to many individuals were omitted.

Using the criteria discussed above, a final selection of twenty-eight items

was made for inclusion in the shortened scale. For convenience this revised scale will be referred to in the future as the "Psychoneurotic Inventory."

It will be recalled that the Psychosomatic Inventory offers four possible answers: "Often," "At times," "Seldom," or "Never," while the Bernreuter Personality Inventory is answered by marking either "Yes," "No," or "?." The use of both systems of answering questions within the same scale was thought to be inadvisable. Since the Psychosomatic Inventory had contributed the major part of the questions the method of allowing the choice of four answers was selected for use with the Psychoneurotic Inventory.

As a result of this decision no scoring weights were available for the questions derived from the Bernreuter Personality Inventory which could be used for the new scale. It was therefore necessary to obtain a criterion for weighting the new answers to these questions.

This was accomplished by using the one hundred soldiers diagnosed as psychoneurotic by neuropsychiatrists of the Army Medical Corps as one of the criterion groups. A second criterion group consisted of 500 undiagnosed trainees in the ASFTC who had just begun basic training. The latter group was selected in a manner to make it representative of the trainees received in the ASFTC at the time of the study. A comparison of this group was likewise made with available information on more than eighty thousand trainees received at the training center over a period of eighteen months. There was no statistically significant difference between the two groups in respect to score on the Army General Classification Test, or in educational achievement as determined by the number of years of schooling received. No statistics were available for age comparisons. The mean age of the 500 man criterion group was 29.2 years with standard deviation of 5.9 years.

The Psychoneurotic Inventory was next administered to the 100 psychoneurotics and the 500 undiagnosed trainees. By means of item analysis and Kelley's formula for weighing items, weights for each response to each item were calculated. The Psychoneurotic Inventory for both the psychoneurotic and the undiagnosed groups were then scored by use of these computed weights.

In order to determine the validity of the new Psychoneurotic scale a comparison of the raw scores made by the criterion groups on the inventory was undertaken. These comparisons are presented in Table VI. Inspection of this table discloses that the mean score for the psychoneurotic group is 109.4 or more than twice as large as the mean score of 49.3 obtained by the undiagnosed group. The critical ratio of 15.7 shows the difference of 60.1 between the two means to be significant and not attributable to chance variations in the samples. From examination of the Table it is seen that the medians show a similar, but even larger, difference between the samples. On the other hand, there are but slight differences found between the standard deviations and between the semi-interquartile ranges of the two groups. It may be concluded, therefore, that the variability of each group is approximately equal, but that the psychoneurotics are grouped chiefly along the upper end of the scale and the undiagnosed soldiers mainly at the lower end of the scale.

As a further measure of the validity of the Psychoneurotic Inventory a biserial correlation was made with scores on the Inventory as the continuous series and diagnosed psychoneurotic—undiagnosed as the dichotomous classification. The biserial coefficient of correlation was found to be .78 with a probable error of .02. It is to be noted that this coefficient of correlation for the Psychoneurotic Inventory is of the same relative magnitude as the corresponding biserial coefficients of correlation calculated for the Bernreuter Personality

TABLE VI

COMPARISON OF SCORES OBTAINED ON THE PSYCHONEUROTIC INVENTORY BY
CRITERION GROUPS OF 100 DIAGNOSED PSYCHONEUROTIC SOLDIERS
AND 500 UNDIAGNOSED SOLDIERS

	No.	Range	Mean	S D	Median	Q_3	Q_1	Q
Undiagnosed	500	1-157	49.3	36.8	37.5	72.4	20.2	26.1
Psychoneurotic	100	9-157	109.4	34.6	115.8	136.2	87.0	24.6
Difference			60.1	2.2	78.3			
Critical Ratio			15.7	0.8	16.3			

Inventory and the Psychosomatic Inventory. The Psychoneurotic Inventory may therefore be considered to have the same degree of validity as either of the longer inventories.

In order to show pictorially the effectiveness of the Psychoneurotic Inventory as a screening test to select psychoneurotics from random samples of trainees the per cent of each group scoring in each ten point interval of raw scores at the midpoint of the interval is plotted in Figure 1.*



FIGURE 1. DISTRIBUTION OF SCORES ON THE PSYCHONEUROTIC INVENTORY BASED ON 500 UNDIAGNOSED AND 100 PSYCHONEUROTIC INDIVIDUALS AT ASFTC CAMP LEE, VA.

Examination of this Figure discloses that the curve for the undiagnosed group which is based on 500 cases is for all practical cases smooth. The curve for the 100 psychoneurotics, however, exhibits irregularities indicating the desire for a larger group in order to obtain a wholly stable distribution. If we accept, however, the trends indicated in the curves depicted, the value of the Psychoneurotic Inventory as a screening test becomes apparent. Keeping in mind the precautions advanced by Hunt (3) for the use of screening tests, it appears that careful consideration and study should be given any individual making a score of 100 or above on the Psychoneurotic Inventory.

* The author recognizes the likelihood that on repetition on other groups, the separation here found will not be so great, because of the use of the same groups for validation as for item analysis and item selection.

In order to determine the relationship of scores on the Psychoneurotic Inventory with the factors of age, education, intelligence, and length of Army service, a series of correlations were made based on the data for the two criterion groups. The results of these computations are presented in Table VII.

TABLE VII

RELATIONSHIP OF SCORES ON THE PSYCHONEUROTIC INVENTORY TO AGCT TEST SCORES, AGE, LENGTH OF SERVICE, AND EDUCATION, FOR SAMPLES OF 500 UNDIAGNOSED TRAINEES AND 100 DIAGNOSED PSYCHONEUROTIC TRAINEES

	Undiagnosed		Psychoneurotic	
	<i>r</i>	<i>P. E.</i>	<i>r</i>	<i>P. E.</i>
Army General Classification Test	-.33	.06	-.08	.07
Age	.12	.07	-.15	.07
Length of Service	.03	.07	.00	.06
Education (Yrs. Completed)	-.23	.06	-.18	.07

Examination of the first row discloses that a negative correlation exists between scores on the Army General Classification Test and scores on the Psychoneurotic Inventory for the 500 undiagnosed trainees. Since the value of $-.33$ for the coefficient of correlation is more than four times its probable error of $.06$, the coefficient is of statistical significance. However, it is difficult to determine whether there is a corresponding psychological significance to the small degree of relationship found, particularly since neither the Bernreuter Personality Inventory nor the Psychosomatic Inventory showed any statistically significant relationship with Army General Classification Test scores for the undiagnosed sample. Moreover, it may be seen from Table VII that no significant relationship exists between the scores made on the Army General Classification Test and the Psychoneurotic Inventory by the diagnosed psychoneurotics. This result would tend to further indicate that psychologically no significant relationship exists between measures of psychoneurotic tendencies and intelligence.

The second row of Table VII contains the coefficients of correlation for age and Psychoneurotic Inventory Test scores. These are found to be $.12$ and $-.15$ for the undiagnosed and psychoneurotic groups, respectively. As the corresponding probable errors are $.07$ and $.07$, neither of the coefficients is of statistical significance.

Inspection of the third row reveals that there is no relationship of significance between length of service and test scores made by either criterion group. The probable errors are, in fact, larger than the coefficients of correlation for the relationship.

The coefficients of correlation between education and Psychoneurotic Inventory scores for the undiagnosed and psychoneurotic groups may be found from row 4 of Table VII to be $-.23$ and $-.18$, respectively, and to have corresponding probable errors of $.06$ and $.07$. There is consequently no significant relationship between the factors of education and psychoneurotic tendencies for the samples used. From the above results it is apparent that no relationship of significance exists between psychoneurotic tendencies as measured by the Psychoneurotic Inventory and the factors of age, education, and length of service.

It may be concluded, therefore, that on the basis of available data, the criterion group of 500 undiagnosed trainees may be expected to obtain results on the Psychoneurotic Inventory that are representative of the entire trainee population and that, accordingly, the utilization of this group's results to establish norms for use in Army trainee populations is justified.

From the foregoing discussion of the relationships between scores on the Psychoneurotic Inventory and the factors of age, education, length of Army service, and Army General Classification Test scores it is evident that, with the exception of the latter, these factors could not have been the cause of the differences found on the Inventory. In order to determine if differences on the Army General Classification Test had been responsible for part or all of the differences found on the Inventory, a comparison of the distribution of score on the Army General Classification Test was made. Inspection of Table VIII

TABLE VIII

COMPARISON OF AGCT SCORES OF NORMING GROUPS OF 500 UNDIAGNOSED SOLDIERS AND 100 PSYCHONEUROTIC SOLDIERS

	Num- ber	Army General Classification Test					
		Mean	S. D.	Median	Q ₃	Q ₁	Q
Undiagnosed	500	100.9	22.1	102.4	118.2	84.6	16.8
Psychoneurotic	100	98.5	19.3	103.6	112.9	88.8	2.0
Difference		2.4	2.8	1.2			
Critical Ratio		1.1	1.8	0.4			

discloses that the mean score for the undiagnosed group was 100.9, and that for the psychoneurotic group it was 98.5. The difference of 2.4 is shown to be statistically not significant by the critical ratio of 1.1. It may be seen that the differences in the standard deviations and median scores of the two groups are also not statistically significant. It may be assumed, therefore, that the differences in scores on the Psychoneurotic Inventory by the two groups are not the result of differences in the intelligence of the two groups as measured by the Army General Classification Test.

Since it has been demonstrated that age, length of service, education, and service command of induction have no relationship to scores on the Psychoneurotic Inventory, the differences shown on these items cannot be considered to have influenced the size of the differences found on the scores of the Inventory by the two groups. Therefore, differences between the two criterion groups on these items, while of interest, are not of immediate concern in this study and will accordingly not be discussed.

A preliminary investigation was made of the relationship between the number of times individuals went on sick call and their scores on the Psychoneurotic Inventory. The calculations were based on data found for one training company of 244 trainees and covered approximately the initial four weeks of the training program. The coefficient of correlation was found to be .25 with a probable error of .04. These results indicate a small but positive relationship between these factors which is statistically significant. Since hypochondriasis is often the predominating feature of psychoneurotic tendencies, the positive relationship is not surprising. It may be noted, however, that the coefficient of correlation found here is so low as to make the sick call record of an individual of little value in predicting his psychoneurotic tendencies. Inasmuch as psychoneurotic tendencies show negligible relationship with length of service, it is extremely doubtful that any significant change would be made in the correlation obtained between sick call and psychoneurotic tendencies by increasing the length of time for which data was obtained. However, it is felt that this is a problem needing further investigation.

SUMMARY AND CONCLUSIONS

In order to investigate the effectiveness of the Bernreuter Personality Inventory and the Psychosomatic Inventory as tests to screen psychoneurotics from large groups of soldiers a study of the Personality Inventory and the Psychosomatic Inventory was made on 100 diagnosed psychoneurotic soldiers and 100 undiagnosed soldiers. Coefficients of correlation between test scores and psychiatric diagnosis were found to vary from .71 for Part II of the Psychosomatic Inventory to .80 for the total of the Psychosomatic Inventory. On the basis of these results the tests were all considered to be valid measures of psychoneurotic tendencies.

An attempt was next made to construct an inventory of psychoneurotic tendencies which would retain the same relative validity and reliability as the Psychosomatic Inventory and the Personality Inventory, but would be shorter, be more easily understood by the soldiers, require less time for administration, and be more quickly scored, since these factors were important in testing large groups. On the basis of an item analysis of the Personality Inventory and the Psychosomatic Inventory, twenty-eight of the most valid questions in those tests were selected and combined into a scale which, for convenience, was labeled the Psychoneurotic Inventory. Using a group of 500 undiagnosed trainees and 100 diagnosed psychoneurotic trainees, scoring weights and norms were calculated for the new scale. Computations based on the distributions of scores on the Psychoneurotic Inventory by the two groups disclosed that the Inventory had a coefficient of correlation with the psychiatric diagnosis of .78. From these results it may be concluded that the Psychoneurotic Inventory, despite the fact that it is much shorter than either the Psychosomatic Inventory or the Personality Inventory, has the same relative validity and utility as a screening test for psychoneurotics as either of the longer scales.

In an attempt to discover whether psychoneurotic tendencies had significant relationship with any factor that could be easily measured, a series of correlations were made. These indicated, that no relationship existed between psychoneurotic tendencies and age, education, or length of service. A low positive correlation was found between scores on the Psychoneurotic Inventory and number of times the men went to the dispensary on sick call. This relationship was not surprising, since it might be reasonably supposed that individuals with pronounced hypochondriacal symptoms would go on sick call relatively more frequently than most stable individuals. Correlations for scores on the Army General Classification Test and psychoneurotic tendencies as measured by the various scales produced contradictory results. A negative correlation, which was low but statistically significant, was found with scores on the Psychoneurotic Inventory. On the other hand, correlations with the Personality Inventory, and with Part I, Part II and the total of the Psychosomatic Inventory were negligible. It is difficult to attribute any cause, statistical or psychological, for these results at present.

On the basis of these correlations, it was concluded that knowledge of the age, education, length of service, Army General Classification Test score, sick call record, and service command of induction of the individuals in a group was of little aid in the screening of psychoneurotics from the group.

BIBLIOGRAPHY

1. ALTUS, W. D. & BELL, H. M. The validity of certain measures of maladjustment in an army special training center. *Psychol. Bull.*, 1945, 42, 98-103.

2. BERNREUTER, R. G. The theory and construction of the personality inventory. *J. soc. Psychol.*, 1933, 4, 387-405.
3. HUNT, W. A., WITTSON, C. L., & HARRIS, H. I. The screen test in military selection. *Psychol. Rev.*, 1944, 55, 37-46.
4. KELLEY, T. L. *Statistical method*. Macmillan Co., 1923.
5. MCFARLAND, R. A. & SEITZ, C. P. Psycho-somatic inventory. *J. appl. Psychol.*, 1938, 22, 327-339.
6. WALLIN, R. Some testing needs in military clinical psychology. *Psychol. Bull.*, 1944, 41, 539-542.

A COMPARATIVE STUDY OF FOUR SCREENING TESTS FOR NEUROTICS

H. J. EYSENCK*

Psychological Dept., Mill Hill Emergency Hospital

This war has seen the emergence of a number of tests designed to "screen" neurotics from the armed forces, or from special work for which they would be unsuitable (6). These tests are either considered to give sufficient evidence by themselves of the subject's instability, or are merely used to pick out candidates to be seen by the psychiatrist. Results reported in academic journals and service memoranda show that some of these tests possess a certain amount of validity in diagnosing "neuroticism," but few data are available to show how different tests compare with one another in this respect.

In the present study, comparative results are reported of the efficiency of four tests in distinguishing hospitalized service neurotics from normal (i.e. non-hospitalized) service personnel. Objections have been raised to this procedure because it is alleged that the neurotic group would have less incentive to do well, and would therefore give differential results not because of their neuroticism, but because of their lesser motivation. Three answers may be made.

1. In a comparative study of normal and neurotic subjects, Slater (9) found no differences on four tests of mental ability used in army selection procedure. To do well on these tests presumably requires considerable motivation. Similarly, direct studies of the influence of incentives on neurotics have failed to substantiate the view that their test-performances are due to lack of incentive (1).

2. In some of the tests used in the present study, the question of incentive does not really arise, as they are not tests of ability.

3. On all the tests used, a control investigation was carried out within the hospital, in order to see whether the more seriously neurotic patients did worse than the less seriously neurotic. Level of seriousness of neurosis was established on the basis of an independent psychiatric report (2), and tests were included in our battery only if they succeeded in discriminating between these two groups at the $P = .01$ level.

The following tests were used.

1. *The Body Sway test of suggestibility* (5). The maximum body sway of the subject in response to the suggestion that he is falling forward, given by a gramophone record, constitutes his score on this test (3); he is instructed to remain standing perfectly still while the record is being played. The critical level is at the two-inch mark: 19% of normal subjects and 74% of neurotic subjects were found to sway two inches or more. The test is usually given as an individual test, but may be given as a group test if provision is made for the automatic recording of maximum body sway. This may be done mechanically, by means of a non-returning pointer, or electrically.

2. *The Dark Vision test*. Dark vision is tested by means of the Livingstone Rotating Hexagon (7) after 30 minutes dark adaptation. Letters and objects are exposed for the subject to recognize, 32 responses altogether at four levels of illumination being called for. A mixture of photopic and scotopic vision is examined by this test. The critical level is at the score of eight: 8% of normals and 71% of neurotics obtain a score as low as this, or lower (8). The test is usually given as a group test.

* With the support of the Rockefeller Foundation.

3. *The Questionnaire test.* This test is of the usual neurotic personality inventory type, laying special stress on physiological manifestations of neurosis, although a few psychological symptoms are included. It is given as a group test, and is probably more influenced by the differential attitudes of neurotics and normals than are the other tests. No critical score is given as the test has not been published.

4. *The Rorschach Ranking test.* This is an adaptation of the Harrower-Erickson Multiple Choice test (4). We found that the Multiple Choice test had too low a reliability to be useful as a screening test (split-half reliability, corrected, = +0.64), and accordingly modified the procedure so as to increase the reliability. This was done by presenting the subject with nine alternative responses to each ink blot,* asking them to rank these in order of applicability, i.e. putting a number 1 after the response most like the ink blot, a number 2 after the response second-most like the ink blot, etc., down to a number 9 after the response least like the ink blot. Four neurotic and five normal responses are offered for each blot, and the numbers of the positions assigned the four neurotic responses by the subject constitute his score for that blot. The best score for each blot is therefore 30 (9+8+7+6), and the worst score is 10 (1+2+3+4). Scores for the ten blots are added, giving a range for the whole test of between 100 (neurotic end) to 300 (normal end). This method of scoring increases the reliability of the test to $r = +0.84$. The test does not correlate highly with intelligence ($r = +0.08$), but shows a slight correlation with vocabulary ($r = +0.27$). The critical level is at the score of 220; 74% of neurotics and 42% of normals score below this level.

These four tests were given to various groups of neurotics and normals,† and compared with each other by means of the Index of Screening Efficiency (S). This index is an adaptation of the formula for the correlation of point distributions, on the assumption that the populations which are being compared are not strictly speaking continuous. The formula is:

$$\text{Index of Screening Efficiency (S)} = \frac{\alpha\delta - \beta\gamma}{\sqrt{p_n \times p \times q_n \times q}}$$

in which α = percentage of neurotics with neurotic scores;

β = percentage of normals with neurotic scores;

γ = percentage of neurotics with normal scores;

δ = percentage of normals with normal scores;

p_n = percentage of neurotic scores;

p = percentage of normal scores;

q_n = percentage of neurotics;

q = percentage of normals.

The index values for the four tests, together with the numbers of subjects tested, are given in Table I. Also given in that table are the values for the four

* These were taken from Harrower-Erickson's list (4, pp. 254-258) leaving out in each case the response "Nothing at all." The actual responses used were: 1, A; 2, A; 3, A; 4, A; 5, C; 6, A; 7, A; 8, B; 9, A; 10, A. Slight verbal modifications were introduced in some cases, to suit the wording to English audiences.

† The neurotic groups were made up of unselected samples of the Hospital population, and are presumably roughly identical. The normal groups probably show greater heterogeneity, but are all slightly superior to the average in point of intelligence and stability.

tests of a slightly modified form of the Selection Index proposed by Hunt *et al.* (6). The formula for this index is:

$$\text{Selection Index (D)} = \frac{P}{P + P_n + P_f}$$

in which P = proportion of neurotics with neurotic score, P_n = proportion of neurotics with normal score, and P_f = proportion of normals with neurotic scores. This index would not appear to give comparable values for different tests unless P is kept constant; for the purpose of this formula the critical level was adjusted to make $P = .75$ for each test. The two indices place the tests in the same order of efficiency, although S would appear to be more sensitive than D to slight differences.

TABLE I
INDEX VALUES AND SUBJECTS TESTED

Test	S	D	Number of subjects tested		
			Normals	Neurotics	Total
Suggestibility	.40	.62	120	900	1020
Dark Vision	.64	.65	6063	96	6159
Questionnaire	.34	.50	1500	300	1800
Ranking Rorschach	.31	.48	150	300	450
Total			7833	1596	9429

While the relatively small number of subjects tested must lead to caution in interpretation, there would seem to be little doubt that the Suggestibility and Dark Vision tests compare very favorably with the Questionnaire test, and that the Ranking Rorschach test is not markedly inferior to it.

In assessing the value of these tests, the time required for administration must be taken into account. The Suggestibility test takes 3 to 5 minutes, the Dark Vision test takes just over one hour in all, the Questionnaire takes 15 minutes approximately, and the Ranking Rorschach test takes 35 minutes. On this basis, the Suggestibility test would appear to be the most efficient measuring instrument of the four.

Conclusion. The results reported may serve to draw attention to three tests (Suggestibility, Dark Vision, Ranking Rorschach) which have not hitherto to our knowledge been used in selection procedures, but which may be useful as "screening" tests. While no one test by itself reaches a high level of prediction, a combination of the tests would considerably enhance their discriminative value. In clinical studies we have found that while the Dark Vision test is particularly discriminative with respect to anxiety states, the Ranking Rorschach test is particularly discriminative with respect to hysterics. Differences in selectivity of this kind may account for the fact that such correlation as we have found between the various tests have usually been rather small; they also argue in favor of the use of several different tests in combination. We therefore put forward the whole battery as a useful measuring instrument for the general personality trait of "neuroticism" (2).

BIBLIOGRAPHY

1. EYSENCK, H. J. The effect of incentives on neurotics, and the variability of neurotics as compared with normals. *Brit. J. med. Psychol.*, 1944, 20, 100-103.

2. EYSENCK, H. J. Types of personality: a factorial study of seven hundred neurotics. *J. ment. Sci.*, 1944, 90, 851-861.
3. EYSENCK, H. J. States of high suggestibility and the neuroses. *Amer. J. Psychol.*, 1944, 57, 406-411.
4. HARROWER-ERICKSON, M. R., & STEINER, M. E. *Large scale Rorschach techniques*. Springfield: Charles C Thomas, 1945.
5. HULL, C. L. *Hypnosis and suggestibility*. New York: Appleton-Century, 1933.
6. HUNT, W. A., WITTON, C. L., & HARRIS, H. I. The screen test in military selection. *Psychol. Rev.*, 1944, 51, 37-46.
7. LIVINGSTONE, P. C., & BOLTON, B. Night visual capacity of psychological cases. *Lancet*, 1943, 1, 263.
8. REES, W. L. Night visual capacity of neurotic soldiers. *J. Neurol., Neurosurg. & Psychiat.*, 1945, in the press.
9. SLATER, E., & SLATER, P. A heuristic theory of neurosis. *J. Neurol., Neurosurg. & Psychiat.*, 1944, 7, 49-55.

CHINESE PILOTS' ATTITUDES TOWARD WAR

YUN EN T'AN

The present study is based on the results of a test given to a group of Chinese pilots. The test used was the author's War Attitude Scale (3, 4, 5) constructed in 1938 at the Institute of Educational Research, National Sun Yat-sen University, Canton, China.

The scale was constructed by applying the Thurstone technique. It consists of two forms, namely Forms A and B, the former of which was used in the present study. The coefficient of reliability of the scale is $.715 \pm .01$, secured through the split-half method for 56 statements, given to 228 tested persons, most of whom were college students. With self-rating as a criterion, the validity was found to be $.612 \pm .03$.

Several studies have been made to analyze the relationship between attitudes toward war and success in military training. However, no such study has been made directly on the war attitudes of military personnel. Thus, the purposes of the present study are as follows:

1. To study the war attitudes of military personnel, namely, Chinese pilots.
2. To compare the results of the test given in 1943 with the results of the test given in 1938 by the author, and,
3. To ascertain the relationship between the war attitudes of the Chinese pilots and their flying ability.

THE PRESENT GROUP AND THE 1938 GROUP

The results of the author's study of the 1938 group have been reported twice in Chinese (3, 4), abstracted in English (5) and summarized in an article by Dudycha (1). It is necessary, therefore, only to compare here the scores made by the two groups.

The criterion for grouping the pilots who took the test is as follows: those whose scale value lies between 7-8.9 may be said to approve war, those from 5-6.9 to be near an approval of war, 3-4.9 to be neutral, 1-2.9 to be near a disapproval of war, and 0-0.9 to disapprove of war.

The mean scale value for the 1938 group is 5.31 with a SD of 1.05; that for the 1943 group is 5.85 with a SD of .43. Considering the reliability of the difference, it is statistically sound to conclude that the 1943 group is less inclined toward "pacifism" than is the 1938 group. It may be seen in Table I that 95% of the 1943 group are favorable or strongly favorable to war, whereas in the 1938 group only 67.9% are favorable toward war.

TABLE I

COMPARISON OF 1938 GROUP AND 1943 GROUP

Scale Values	Percent 1938 group	Percent 1943 group
0-0.9	0.0%	0.0%
1-2.9	3.9%	0.0%
3-4.9	28.2%	5.0%
5-6.9	65.3%	95.0%
7-8.9	2.6%	0.0%

During the process of training and several months after the test was given to the 1943 group, the pilots were divided into three groups: those assigned to single engine training, those assigned to twin-engine training, and those elimi-

nated from further flying training either in the beginning of the flying period or during the OTU training. The question now arises: to what extent did the attitudes of the pilots toward war contribute to their being placed in their respective groups? Are the eliminated pilots more inclined toward "pacifism" than the others? Are those in the single-engine or pursuit group less pacifically inclined than those in the twin-engine group?

The mean score for the single-engine group with 27 cases is 5.87 and for that of the twin-engine group with 25 cases is also 5.87. The SD for the former is .41 and the latter is .32. Statistically, the difference is not significant.

The eliminated group includes disqualified pilots. The author first believed that the pilots in this group were more inclined toward "pacifism" than those in the other groups. However, as the result shows there is no more nor less "pacifism" in this group than in the others. The mean score for this group is 5.82 with a SD of .50.

The reliability of the difference in the mean score between the eliminated group of the 1943 and that of the 1938 group is statistically significant. There is less "pacifism" in the former than the latter.

WAR ATTITUDE AND FLYING ABILITY

The materials collected to study the war attitude and flying ability came from two sources: (1) The mean score of the eliminated group and (2) the average flying rating grades that were obtainable during their basic and operational training.

The flying ability is based on the flying rating of the pilots by their flying instructors. The author checked the flying record of the whole group. He found only 29 cases with flying grades available for the present study. Correlating the flying grades, which were numerically stated, with the mean score of the war attitude test, it gave a result of an r equal to .16.

The mean score given for the eliminated group, as stated above, was 5.82. If the assumption that the eliminated pilots were more inclined toward "pacifism" because of their inferior flying or vice versa is correct, their mean scores should have been less according to the grouping criterion. However, as statistics show, their mean scores showed no less "pacifism" than those of the other groups. Thus, considering these findings, the author comes to the conclusion that the war attitude factor does not interfere with their flying.

With the results that were obtained from the two sources given above, a general conclusion might be drawn that the war attitudes of this group of Chinese pilots have practically no relationship to their flying ability.

DISCUSSION

In the author's 1938 group, 67.9% of the students were favorable or strongly favorable toward war. The main factor that had contributed to this attitude was the fact that China was at war and that the students had either seen war or had seen bombing of cities or had seen sufferings of innocent women and children of the war zones.

The present group, with 95% favorable toward war, evinced less "pacifism" than the 1938 group. The contributing factor, as estimated by the author, is that the present group is a more homogeneous group. One hundred percent of them have had military training and actual experiences both in the army and air force. With this training and experiences they have developed a strong and positive attitude toward war. This might be the very fact that caused the difference between the 1938 group and the present group.

American psychologists have made many studies of the war attitudes of youth as summarized in Dudycha's article (1). An article by Sherman (2) reported the attitudes toward the war effort of 7,000 Chicago youths of high school age. However, no study has as yet shown great proportion of the subjects with an attitude highly favorable toward war; even though some studies used boys who were in military programs, they nevertheless show no evidence of strongly favorable attitude toward war. Sherman's study, made after the United States entered the war, showed only 56% of the youth favorable toward war (included mildly favorable, favorable, and strongly favorable).

When the results of the American studies are compared with the author's findings, it is believed that the contributing factors to the difference were as follows:

1. That the American group had had no direct contact with the war condition, even though some of the students had taken military training.
2. That they are in a more prosperous and peaceful social milieu and have a minimum of opportunities to visualize the tragedy of war, and,
3. That they are less politically conscious.

The lack of a significant relation between war attitudes and flying ability is interpreted by the author as follows:

1. That the testing dates and flying rating dates were too widely separated. There was about a ten months lapse of time in between. The time and place might be the factors that have affected the results.
2. That the attitude factor has nothing to do with performance.
3. That the test does not purport to predict war attitudes.
4. That the cases studied were statistically insufficient.

SUMMARY

1. Of the Chinese pilots tested in 1943, 95% were favorable toward war, with only 5% in the neutral category.
2. The author's 1938 group when compared with the present (1943) group was more inclined toward "pacifism."
3. When war attitudes are correlated with flying ability, no statistically significant results are obtained.
4. No significant differences were found between the single-engine group, the twin-engine group and the eliminated group.

BIBLIOGRAPHY

1. DUDYCHA, G. J. Attitudes toward war. *Psychol. Bull.* 1942, 39, 846-860.
2. SHERMAN, MANDEL. The attitudes of youths of high school age toward the war. *Psychol. Bull.* 1943, 40, 294-99.
3. T'AN, YUN EN. The construction of a war attitude scale and its testing results. *Monogr. Series Institute of Educ. Research, National Sun Yat-sen Uni., China*, 1938 (Chinese).
4. T'AN, YUN EN. The construction of a war attitude scale. *J. Educ.* (Chinese) 1940, 30, 1-15.
5. T'AN, YUN EN. The construction of a war attitude scale. *Psychol. Abstr.* 1941, 15, 294.

PSYCHOLOGY AND THE WAR: NOTES

The *Committee on the Relocation of Military Psychologists* of the Military Division of the APA reports several activities in the interests of psychologists in the military service. A questionnaire designed by the Chairman of the Committee (Lieut. Steuart Henderson Britt, USNR) has been mailed to every psychologist and psychologist-in-training who is or has been in uniform, in order to obtain specific data on the history of the utilization of psychologists in the military service, and on the courses and instruction in psychology desired by those planning to return to college and professional school.

All those who reply that they plan to continue their education are receiving a digest of pertinent materials regarding provisions for financing their education; this digest was prepared by Lt. (jg.) John G. Darley, USNR, and Capt. Hugh M. Bell, AUS. In this connection it is believed that the sections of the "G.I. Bill of Rights" covering re-employment will hold for psychologists on leave of absence from academic institutions and that their colleges are obligated to take them back at the conclusion of their period of military service. The Committee has found that the American Association of University Professors is following this problem closely, although no test case has arisen.

The Committee has also kept in touch with various officers in charge of both Army and Navy programs in psychology, to be informed of the demobilization plans in these programs. Evaluations of military service in psychology will be made by cognizant officers in each program, and records are being assembled for this purpose now. As an example, special forms have been developed by Col. John C. Flanagan, AUS, in order to develop suitable records for ready reference in answering inquiries and making recommendations based on evaluations of work in the Aviation Psychology Program of the Army Air Forces. These forms are adaptable for use by the Office of Psychological Personnel.

The Committee has also made sure that certain investigations carried on by other non-military committees have contained adequate references to the questions and rights of returning servicemen; and has answered specific inquiries of psychologists in the service. All correspondence should be addressed to the *Chairman of the Committee on the Relocation of Military Psychologists, c/o Office of Psychological Personnel, 2101 Constitution Avenue, Washington 25, D. C.*

Transfer of Clinical Psychological Services from the Adjutant General's Department to the Medical Department. The close functional relationship between psychiatry and clinical psychology has been repeatedly stressed during World War II. As a result of the final recognition of this fact, and the strong desire to perpetuate this relationship in the Post-War Army, the Office of the Chief Clinical Psychologist, Classification and Replacement Branch, AGO, has recently been transferred to the Surgeon General's Office, and Lt. Col. Morton A. Seidenfeld assigned there as Chief, Clinical Psychology Branch, Division of Neuropsychiatric Consultants. Capt. L. I. O'Kelly has been designated Assistant Chief of the Clinical Psychology Branch.

In addition to moving the central offices over to the Surgeon General's Office, provision has been made for the detail of all clinical psychologists now serving as officers into the Medical Administration Corps. This will permit an increase in the effectiveness of their utilization in medical installations, where they will be under the direct control of the Medical Department.

BOOK REVIEWS

LEIGHTON, ALEXANDER H. *The governing of men*. Princeton: Princeton University Press, 1945. Pp. xvi+404.

In the spring of 1942 the United States Government established ten Relocation Centers in the West and Middle West and sent to these centers all of the approximately 110,000 Japanese who had lived in the Pacific coastal areas. The government proposed to develop genuine communities for these people and to train them in self-government and economic independence. It adopted further the policy of establishing in one of these centers, located at Poston, Arizona, a research unit in "social analysis," with two major objectives: (1) aid to the administration of the project through studies of the behavior of the evacuees, (2) advancement of the understanding of the social dynamics of displaced communities in general, which might be useful in the governing of occupied territories.

Lt. Commander Leighton, a psychiatrist with experience in applied anthropology, came to the center in its early days and for more than a year directed the unique research effort to appraise the forces operating during the inception and growth of a new society. This book is an account of this work, primarily in terms of its bearing upon the problems of government of occupied areas. It is written therefore mainly for the non-scientific reader, although there is a lengthy appendix which records the technical history of the project, including the conceptual framework, the methods and the types of results secured.

Although non-scientific in presentation, Leighton's book is a valuable scientific document, both as a contextual analysis of the growth of an unusual community and as an exhibit of the methodological state of the emerging science of social anthropology. It is presented in two parts, the first entitled *The Story of Poston*, the second, *Principles and Recommendations*.

The nature of the situation, as well as Leighton's psychiatric background, probably determined that the first part would assume the form of a "case history." For the community was in process of continuous change due to external and to internal stresses, with the result that no fixed program of study could be followed under uniform conditions. There was Washington with its bureaucratic modulation of the governmental framework, which often brought specific regulations into conflict with stated general policy. And within the center there was the social ferment resulting from the disruption of the previous organization of Japanese-American society and from an administration which in its lower levels exhibited intense anti-Japanese feeling. Leighton presents a skillful and interesting picture of this society's trial-and-error struggle towards structural definition, with special attention to the successful effort to achieve a measure of self-government. There is very little of explicit conceptual formulation in this chronicle of events, but he seems to have brought the essential social forces into clear relief. At the end of this section these forces are reduced to nine major themes which, in combination, are held to be the essential determinants of the conflict and adjustment described. The level of description is fortunately social not "psychiatric" in character.

The *Principles and Recommendations* are based upon Leighton's conviction "that in the Relocation Camp experience my hands groping blindly below the surface touched here and there on a real body of constants and laws in human living." The confession of "blind groping" sounds somewhat ironic in the face

of the formidable list of 58 principles and 142 recommendations which are presented under these headings: (1) individuals under stress, (2) systems of belief under stress, (3) social organization under stress. Aside from the dimensions of the learning task set for the prospective governor, there is the triteness and essential duplication to be expected in such an exercise of verbal refinement. Furthermore, the formulation of general rules of government apart from a political context can produce serious incompatibilities. Leighton recommends, for example, that a governing body integrate itself into the prevailing patterns of authority in the community. Whatever our present practice in Germany and Japan, this principle is at variance with our stated political aims.

The emergency pressure for immediate publication, together with the practical objectives, prevented Leighton from appraising his material systematically in the light of research and concepts from related scientific fields. As a result the conceptual frame of reference is somewhat "provincial" in nature, and he takes occasional liberties in psychological explanation, viz: "fear of isolation is probably another very basic and innate tendency." In the general interest of social science, therefore, one hopes that the task of systematic analysis and integration will be carried forward in later studies. The author's sensible and sensitive appreciation of the unique pattern of social relations present in this relocation center suggests that such a development would yield rich scientific returns.

LYLE H. LANIER

Vassar College

MURPHY, G. (Ed.) *Human nature and enduring peace*. Third Yearbook of the Society for the Psychological Study of Social Issues. New York: Houghton Mifflin, 1945. Pp. xi+475.

This third Year Book of the Society for the Psychological Study of Social Issues not only lives up to the promise of its predecessors, but in many ways exceeds them as an excellent, fairly popular summary of what psychology has to offer for the field in question. Like the other books this one is a symposium with contributions from many hands, this time from not only psychologists, but sociologists, political scientists, economists, anthropologists, newspaper correspondents and even men of affairs. The difficulty in most symposia, which was also shared to some extent in the previous Year Books of the Society, namely that the individual contributions overlap to a great extent and that they vary decidedly in completeness and in stylistic niveau, has been overcome by Doctor Gardner Murphy in a rather novel and very successful fashion. Murphy as editor, writes Part One (the introductory section, *The Impulse to War*) and Part Four (the summary, *World Order is Attainable*.) To the reviewer these two sections stand out both for the brilliance of their presentation and of their organization. Not only does Murphy begin and end the book but he inserts correlating paragraphs between the contributions of all of the other writers so that at times one forgets that this is a work of many hands. In passing, let it be said that Gardner Murphy is far too modest about his own contribution to this work. Actually, the title page should read: Edited by Gardner Murphy and written by Gardner Murphy, with the collaboration of the other contributors.

As is now generally known, the purpose of these Year Books is to direct psychological research toward contemporary problems and to make the results of such research available to citizens outside of the psychological profession. The problem for consideration in this Year Book is certainly the most important which faces us today. Although it is obvious to nearly everyone now that psy-

chological factors do enter into the problem of the genesis of wars and the problem of keeping the peace, it is also obvious that psychology must be augmented by economics, sociology and political science, and what is even more important, by the practical acts of the powerful of the world if the peace is to be kept.

So from the first, Murphy calls not only on psychologists but on members of the other pertinent professions to discuss the problem. Neither the professional psychologist nor the professional sociologist, economist, and so forth, will find in this book much that is new to his own particular field, but the psychologist should read it, and the sociologist and others also, for the integration of his field with the various other disciplines. Finally, of course, in accordance with the aims of the Society, the book is addressed to the larger audience of the educated citizenry. It is hoped that it will have a wide circulation.

In Part One, *The Impulse to War* in six succinct and charmingly written chapters Murphy points out just what psychology can and cannot do, debunks the various one-sided causal theories regarding the beginnings of war, and gives us a preliminary view of what might be considered an adequate strategy against war. This argument cannot be even abstracted in the compass of a brief review, but it can be said that it is considered and cogent.

In Part Two, *The Obstacles to Peace* are discussed by Curt Bondy, Clarence H. Leuba, Hans Margolius, Rudolf Arnhem, Fritz Schreier, Charlotte Bühler, Owen Lattimore, Audrey Menefee, Prynns Hopkins, Seth Arsenian, Leo Gershoy, Sir Norman Angell, Alice Thorner, John Gardner, Sidney S. Harcave, Edgar Snow, James L. Graham, Daniel Katz, Sylvanus M. Duvall, and R. N. Sanford. This section is far from a Pollyannalike optimism but it cannot be considered downright pessimistic. We at least now know what some of the barriers are, and the type of political, educational, religious and psychological program which must be overtaken to overcome them.

Part Three, *A Positive Program* has contributions by Quincy Wright, Alfred W. Jones, Horace B. English, R. M. MacIver, Sheldon Korchin, Gordon W. Allport, Lawrence K. Frank, Harry Overstreet, Ross Stagner, William J. Carr, Jane Gibson Likert, Ralph Gundlach, Edgar Snow, Eugene Lerner, Goodwin B. Watson, Margaret Mead, Paul M. Limbert, Kurt Lewin, Ronald Lippitt, Charles Hendry, Alvin Zander, John R. P. French, Jr., David Kuselewitz, Lee Emerson Deets, Seward Hiltner, Luman Shafer, Kenneth B. Clark, George H. Seward, Jerome S. Bruner, Gerhart Saenger, H. H. Remmers, Harold Lasswell, Ernest Kris, Houston Peterson, Alvin Johnson, and Lawrence K. Frank. This section gives certain positive suggestions with regard to keeping the peace. The goals are clear. We must maintain the peace; we must have freedom; we must have an expansion of the democratic processes, and we must not substitute class war at home for international war abroad.

In Part Four, *World Order is Obtainable* Murphy subsumes the argument and the book ends with a brief chapter entitled *A Note On Insecurity* by Ralph K. White and the now very well known psychologist's *Manifesto on Human Nature and the Peace*. In a field where to the professionals and even to the laity there often seems more disagreement than agreement, it is very gratifying indeed that on these really vital issues such unanimity of opinion was obtained amongst the members of the American psychological societies.

The cautious reviewer usually adds a few words at least of criticism at this point. Concerning this book, appearing at the time when it did, it is almost impossible to do this. There are only a few minor points. While it is true that some of the individual contributions were evidently seriously thought through and well worked over before they were sent to the editor, others bear the earmarks of simple rather freely dictated statements. Despite the editor's at-

tempt to present the material in a language which would be universally understood by the educated laity, not a few contributors still fall back into our almost unspeakably awkward technical lingo. The book also is a small one as such books go, and with the whole trend in publishing toward mass editions priced at very reasonable rates, \$3.50 for this volume seems exorbitant, particularly with regard to the audience to whom it is addressed. The bibliography is fairly complete, but certainly a few outstanding items are omitted and since the bibliography is not classified nor given with any critical comments it will be of small use to the lay reader.

This review is being written on August 14, 1945. It is a sad commentary on our society that we cannot now feel only relief that the greatest war in history is over and view the future with equanimity. But remembering the return to "normalcy" after 1918 it is perhaps a hopeful sign that we are concerned with the organic structure of our whole social living and that we do realize big changes must be made. It is, of course, impossible to estimate just how much research and writing influence political events. But as Slochower states in his recent book *No Voice is Wholly Lost*, the reviewer can only hope that the voices of Doctor Murphy and his collaborators will not be lost at all, but will gain the audience of the educated citizenry for whom it is intended and the ear of the politically powerful for whom it has so much to say.

J. F. BROWN

Beverly Hills, Calif.

DORCUS, R. M. & SHAFFER, G. W. *Textbook of abnormal psychology*. (3rd. ed.) Baltimore: Williams & Wilkins, 1945. Pp. xv+547.

The third edition follows six years after the second. It contains 365 new references and 52 more pages of text. Its organization, however, is not materially changed. There is the same number of chapters with the same—or virtually the same—titles, arranged in the same sequence; practically all of the old content remains, and assimilation of the new is largely by insertion rather than reorganization.

There is a more extensive treatment of psychoanalytic concepts, especially with respect to their evaluation in the light of recent experimental evidence, and a perceptible inclusion of new material on incidence, etiology, and experimental therapy for various disorders. The greatest single modification, however, is in the chapter on treatment by physical and chemical assault (formerly chemical therapies) which is largely rewritten, comprises 10 more pages, and accounts for over a third of the new reference material. It contains an excellent discussion of shock therapies—metrazol, insulin, and electric—and a commendable section on prefrontal lobotomy. New topics treated elsewhere in the book include aniseikonia, air, sea, and motion sickness, psychosomatic medicine, experimental neurosis, Wechsler's conceptions of intelligence and its measurement, factor analysis, and psychological deficit. There is an occasional reference to Rorschach material.

The book is a rich source of new reference material; its 365 new references, which have been added to the 468 previous ones, are up to date and fairly inclusive, although there are lacunae, as for example, a scarcity of references to projective studies. Coverage of the new, which comprises something over ten percent of the text space, tends to be bunchy; one may read a good many pages of the old—in one instance a whole chapter—without encountering anything new, and where the new does appear it is likely to do so in concentrated doses.

Since the revision assimilates an appreciable amount of new and up to date material, and yet retains the previous plan of organization and practically all of the previous content, its welcome by those who have found former editions satisfactory is predicted; its acceptance by others is more problematical.

WALTER C. SHIPLEY

Wheaton College, Norton, Mass.

KLEIN, D. B. *Mental hygiene, the psychology of personal adjustment*. New York: Henry Holt, 1944. Pp. xiii + 498.

Here is a distinctly better than average mental hygiene text. The author well achieves his goal of a book for non-professional readers, which does not sacrifice basic accuracy. The treatment is admittedly selective, based on the author's experience, in terms of problems most likely to be met in the ordinary course of events. In the reviewer's opinion, relative emphases are generally well placed. For example, Klein is singularly free from fixed ideas with respect to causes of disorder or factors in improvement. He deals far more with the general conditions for and principles of improvement of adjustment than with therapy for specific difficulties. There is, thus, only passing resemblance to the more common treatment of mental hygiene classification and description of disorder, with recommended modes of therapy.

The book differs in other respects from more conventional patterns of writing in its subject. Dr. Klein faces objectively certain phenomena which many writers have avoided as improper subject matter for scientific writing. An example is his treatment of the significance of conscience and ethical standards in mental conflict, in which he interprets the traditional vocabulary of conscience in terms of incentives, motivation, and the concepts of the id, ego, and superego. Although Freudians may object to over-simplification of the latter, the discussion is provocative and offers helpful material on how adjustment to social codes relates to personality integration. There is also a stimulating re-interpretation of the function of repression in the solution of mental conflicts. The discussion of motive recognizes that the simple physiological needs are far less likely to produce the common difficulties and conflicts of life than the more complex, derived needs. There are excellent chapters given to the roles of social and economic status and family environment in promoting or hindering mental health.

In the reviewer's opinion, the treatment of the Wickman-Stogdill studies of child behavior is particularly commendable. The majority of psychological and educational texts present the findings of these studies uncritically. Dr. Klein, cognizant of Goodwin Watson's critique of these studies, points out some theoretical implications arising from his own thinking and offers a defense of teachers and parents as practical mental hygienists.

The author's style is discursive, easy to read, and a bit rambling. The student with a passion for compact, internally consistent and rigidly systematic theory will criticize this volume sharply. The eclectic will no doubt be pleased with the author's easy utilization of concepts from Freud, Lewin, Pavlov, Landis and Page and many other sources.

The text is primarily didactic, but it avoids homily, and includes reference to a wide body of research papers as well as to the literature of opinion. Tabular and graphic materials however are almost non-existent.

DALE B. HARRIS

Lieut., USMCR, U. S. Naval Hospital,
Philadelphia 45, Pa.

WEISS, E. & ENGLISH, O. S. *Psychosomatic medicine*. Philadelphia and London: W. B. Saunders Company, 1943. Pp. xxiii+687.

This volume's scope is aptly described in the subtitle: *The Clinical Application of Psychopathology to General Medical Problems*. The term psychosomatic medicine is used in various ways. Some writers limit it to specific types of illnesses of known psychogenic origin but with actual physical disease. Others extend it to apply to functional disorders, not including the conventional neuroses and psychoses, however. Still others, including the authors of this text, subsume an even larger area of medicine, indeed the whole of medicine, including psychiatry, under the term. The following quotations make clear the scope of the term in the minds of the authors:

The term psychosomatic illness has not yet been exactly defined or generally accepted. Some physicians use the term psychosomatic illness synonymously with psychoneurosis and it is true that psychoneuroses and psychoses are often psychosomatic illnesses. Others restrict its use to disorders such as migraine, essential hypertension, and asthma, in which the vegetative nervous system seems to be fundamentally involved. We use the term in a wide sense to cover not only the physical manifestations of neurotic and psychotic disorders; the diseases of the vegetative nervous system; but also, and most importantly, the great variety of mixtures of psychological and structural disorders which make up the bulk of the practice of medicine (548). . . . Psychosomatic medicine at the present time embraces the neuroses plus an extension of our knowledge of neuroses to the psychopathology of other conditions previously thought to be in the realm of purely physical medicine (43). . . . All medicine is psychosomatic medicine (41).

The concept of psychosomatics leads to an approach in medicine that is radically different from the purely organic attitude.

The day is near at hand for the final outmoding of the "either-or" concept (either functional or organic) in diagnosis and to place in its stead the idea of how much of one and how much of the other, that is, how much of the problem is emotional and how much is physical. This is truly the psychosomatic concept in medicine (7). The diagnosis of functional illness must be established not simply by the exclusion of organic disease but on its own characteristics as well. In other words, neurosis has its own distinctive features to be discovered by personality study. . . . This applies not only to problems in which evidence of structural disease has been excluded but also to patients who present evidence of physical disease and emotional factors. . . . The either-or concept in medicine must be displaced by the idea of how much of the problem is psychological and how much of it is physical and what is the relationship between the two (164-165). One of the great mistakes in medicine is to relegate the diagnosis of a functional disorder to the background, to be considered only after physical diseases have been excluded (302). The fundamental error of modern medical science has been the divorce of both (medicine and surgery) from psychiatry (15). (This division has resulted in many unnecessary operations; the surgeon was deceived by his organic training into thinking that he could cut out of the body a pain that had its origin in the emotional life. (190).

Psychosomatic medicine thus demands an approach to the patient that stresses the importance of personality study, or social history taking, involving a study of the whole person, not systems.

. . . To study patients . . . simply as physiological mechanisms and treat them by mechanical measures, without making some effort to understand the emotional makeup, is a very one-sided and inadequate attempt to deal with the disorder. . . . Indeed, we

venture to suggest that the time is approaching when the physician will consider the neglect of the psychological study just as serious an omission, in the total study of the patient . . . as the failure to x-ray . . . a patient (230-231).

It therefore becomes, in the opinion of the authors, the function of the general practitioner to attempt psychotherapy with the milder cases of psychosomatic disorder, and, in the more serious cases, to refer the patient to a psychiatrist. "It is not sufficient to tell a patient that the trouble is not organic and that he should go out and do his job" (207).

In line with this reasoning, the authors have written a book to assist the general practitioner who perforce is practicing psychosomatic medicine. Chapter I consists of a summary-survey, in which three groups of psychosomatic problems are delineated: (1) those in which no organic disease is present; (2) those in which organic factors are present but not sufficiently serious to account for the symptoms; and (3) diseases of the vegetative nervous system (migraine, asthma, essential hypertension, etc.) generally considered in the realm of physical disease but in which psychic factors are or may be important in etiology and treatment. Chapter II, *Personality Development and Psychopathology*, outlines the psychoanalytic theory of development, following Abraham and other psychoanalysts, and includes brief discussions of the common neuroses and psychoses. Then follow a series of chapters on the psychosomatic disorders of the various systems—cardiovascular, gastrointestinal, endocrine, genito-urinary, respiratory, and the central nervous system. A chapter on the special senses, the eye, the ear, the skin, and one on special topics—allergy, dentistry, arthritis—are included. A brief chapter on psychosomatics—or psychoneuroses—in military medicine is inserted, without much justification, at this point. The remainder of the book, with the exception of a brief concluding chapter on training in psychosomatic medicine, is devoted to therapy.

The first chapter of the treatment section gives a good discussion of the psychosomatic history, which is similar to the usual psychiatric history, and a discussion of therapy in the common neuroses and psychoses, is apparently included because of the authors' belief, that psychosomatic medicine includes the common neuroses and some psychoses, and that psychosomatic disorders of the various systems can be classified under the usual neuroses, i.e., disturbances of the cardiovascular system for example can be diagnosed as anxiety neuroses with cardiac manifestations, a method which the authors prefer to the use of the term "cardiac neurosis." Another chapter discusses "normal" problems in psychotherapy, from feeding difficulties in infants, through adolescence and marriage problems, to work adjustment and the problems of ageing and senescence. Much excellent advice is condensed in this chapter. The final chapter on therapy deals with special procedures, and treats of various therapeutic measures, classified according to Menninger's division into suppressive and expressive therapy, the latter including a discussion of psychoanalysis.

The section on therapy is not closely articulated with the preceding chapters. There appears to be little connection between the discussion of psychosomatic disorders and the treatment methods outlined. These methods are those used with the common neuroses, and in common with most psychiatric texts, the section on treatment is rather barren. In the cases presented in the earlier part of the book, the discussion of treatment is disappointing; the comment frequently appearing that treatment was not possible, or that the patient

could not be followed. The book is likely to be of little practical use to general practitioners in treating psychosomatic disorders psychotherapeutically.

In general, the authors have done an excellent job of presenting the concepts of a field which Cobb has called the "borderlands of psychiatry," and which might also just as well be called the borderlands of medicine, and in discussing the various manifestations by systems. Omissions of reference to the literature in certain areas, such as the work of Wolff and Wolf in peptic ulcer, could be pointed out. However, in a work of such an extensive nature, everything in the literature could not have been included. While not as rich nor as stimulating as Dunbar's *Psychosomatic Diagnosis*, which analyzes extensively the personality patterns and characteristics of the various psychosomatic disorders, it is a valuable reference for physicians and psychologists alike.

The book has an excellent index, a list of fifteen selected readings, and references, arranged by chapters at the end of the text. The references are not extensive, however, and by no means constitute a bibliography of psychosomatic medicine. They follow the annoying medical practice of not listing the title of the article.

C. H. PATTERSON

2nd Lt., AGD

NOTES AND NEWS

HOWARD DANIEL MARSH, retired professor of psychology and former chairman of the department, City College (New York), died, August 26, in St. Petersburg (Fla.). Dr. Marsh, who was seventy-four years old at the time of his death, had served as an instructor in philosophy and psychology (1906-07), Ohio Wesleyan University, and at City College as instructor in psychology (1907-17), assistant professor (1917-32), associate professor (1932-39), and professor and chairman of the department (1939-41). Dr. Marsh's published works include "The Diurnal Course of Efficiency," "Sex Differences in Fasting," "The Psychology of Work," and many articles in technical journals. Dr. Marsh was a Life Member of the APA.

CHARLES SPEARMAN, professor emeritus of psychology of the University of London, died on September 17 at the age of eighty-two years.

WALTER BRADFORD CANNON, George Higginson professor emeritus of physiology, Harvard Medical School, died, October 1. Dr. Cannon would have been seventy-four years old on October 19. For many years Dr. Cannon was a member of the APA.

A. S. CLAYTON, professor of philosophy and psychology, Talladega (Ala.) College, has been appointed associate professor of psychology and education, Western Illinois State Teachers College (Macomb).

Tulane University has announced the following promotions in the department of psychology: **AGNES THORSON LANDIS** to assistant professor, and **CECIL W. MANN**, assistant professor, to head the University's veterans' guidance office.

SEYMOUR B. SARASON, chief psychologist at the Southbury Training School, has been appointed assistant clinical professor in the department of psychology at Yale University.

MILDRED SAUPE, formerly director of education, Missouri State School for Epileptics and Feeble Minded, has been appointed professor of psychology at the Missouri Valley College (Marshall).

ELMER B. SIEBRECHT, formerly of New York University, has assumed his new duties as dean and associate professor of psychology, Gustavus Adolphus College (St. Peter, Minn.).

WILLIAM U. SNYDER, formerly of Ohio State University has taken a position as assistant professor in psychology at Pennsylvania State College, where he will continue his work in the area of clinical psychology. In August he directed a one-week institute on the counseling of personal problems in industry, held at Ohio State and attended by twenty personnel officers from Ohio industries.

GORDON L. WALLS, of the scientific bureau of the Bausch and Lomb Optical Company, Rochester, N. Y., has been appointed as research associate in the department of psychology of the University of Rochester for one year. Dr. Walls plans to continue his work with the optical company.

At the Agricultural and Mechanical College of Texas (College Station), **G. B. WILCOX** has been appointed head of the department of education to

which the department of psychology has been attached. WALTER V. VARVEL has been advanced to a professorship in psychology.

Michigan College of Mining and Technology (Houghton) has announced that the department of mining and civil engineering has been divided and that a department of engineering administration has been created to include "work previously assigned to the department of economics and government and to that of psychology and sociology."

NRC Fellowships. The National Research Council announces that fellowships in mathematics, astronomy, physics, chemistry, geology, paleontology, physical geography, zoology, botany, agriculture, forestry, anthropology and psychology will be available for the year 1946-1947. These fellowships are awarded as a rule to persons under thirty-five years of age who are citizens of the United States or Canada, and who have met all the requirements for the doctor's degree. Applications must be filed on or before December 31, on forms obtainable from the *Secretary of the Fellowship Board in the Natural Sciences, National Research Council, 2101 Constitution Avenue, Washington 25, D. C.* A handbook describing the fellowships—stipends, conditions and tenure—will be furnished upon request.

Graduate Fellowships at Michigan for Veterans. The Executive Board of the Graduate School of the University of Michigan has established a number of special fellowships for exceptionally promising graduate students whose studies have been interrupted by the war. The stipends will usually be \$1,000 less tuition, but adjustments will be made in accordance with the financial circumstances of the successful applicant. Applicants must have the active support of the department in which they wish to study, and if not previously enrolled in the University, must furnish full transcripts of their work. Evidence of fruitful experience during the war period should also be presented. Interested applicants should write to the *Dean of the Horace H. Rackham School of Graduate Studies, Ann Arbor, Michigan.* Registration for the Fall term of the University opens October 29, 1945, and for the Spring term, February 28, 1946.

Assistantships for Graduate Students in Educational Psychology at Syracuse. Two \$1,500 assistantships beginning January 1, 1946, are available to advanced graduate students in educational psychology in the school of Education at Syracuse University. One assistant will work in the area of child psychology and the other in the area of adolescent and adult psychology. Assistants may carry up to 9 hours of graduate work and will have the opportunity to carry on research for their Doctor's degrees. Prospective candidates should make application at once to DR. MAURICE E. TROYER, *Chairman, Evaluation Service Center, Syracuse University, Syracuse 10, New York.*

Executive Secretary, American Psychological Association. DAEL WOLFE has been appointed Executive Secretary of the American Psychological Association. He will assume his new duties on January 1, 1946. The central office of the APA will be located in Washington, D. C. and will continue the functions now carried out by the Secretary, the Business Manager, and the Office of Psychological Personnel. Dr. Wolfe was formerly associate professor of psychology at the University of Chicago, and during the past two years has been on leave for work with the Applied Psychology Panel, National Defense Research Committee.

Vo

RVEL

P

anced
that
clude
ment

allow-
ology,
and
s are
ens of
or the
forms
ences,
C. A
will be

of the
per of
udies
0 less
circum-
pport
rolled
nce of
rested
aduate
ersity

acuse.
ranced
ion at
nology
s may
rry on
ke ap-
Service

OLFLE
al As-
office
ctions
fice of
of pay-
s been
se Re-

To

be

Me

var

to

AF

pag

att

tail

Sec

wh

Sec